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What is Co-operation?

Free Choice or Compulsion for the Public

At last week's E.D.A. luncheon Major Lloyd George's remarks upon the valuable assistance given by the electricity supply industry in the Fuel Economy Campaign were warmly received. But there was a perceptible fall of temperature when, later, he came to the subject of co-operation with the gas industry.

In the past, said the Minister of Fuel and Power, there had been many tussles between gas and electricity, but in future they must be complementary, not antagonistic. We would not get the best if there were an internecine struggle.

Improvement Through Competition

It would seem that Major Lloyd George has not been given the right perspective in this matter. The tussles to which he referred have not been battles, but ordinary commercial competition between two parties well able to look after themselves. It has really been "healthy" competition because both gas and electricity have been improved by it. Each move of one side has been followed by an attempt to go one better, with the result that the public now has available two very efficient services and has a free choice between them.

Appliances have become better and better—and, more than that, both industries have striven for the greatest efficiency in production, an important point for the Ministry to consider. The Ministry's aim is, or should be, to secure the most efficient production and utilisation of our coal resources. It can be claimed by both gas and electricity—particularly electricity—that the "internecine struggle" has led to a very considerable advance in the efficiency of utilisation.

The electricity supply industry, starting from scratch at about the beginning of the century, has naturally grown at a faster rate than the gas industry. It may be true to say that in the course of its growth it has secured business which the gas industry might have had. But it is far more likely that the competition has created new business by bringing electricity (or gas) within the reach of more and more people. It is not forgotten, of course, that electricity has found entirely new fields of activity.

"Proper" Spheres

With this in mind, electrical people will want to know what co-operation means and what it will achieve. They deny that to offer the public a free choice is overlapping and Major Lloyd George himself said that all new houses should be equipped to take advantage of gas, electricity or solid fuel, as desired by the tenants. They have a suspicion that influences are at work to define the "proper" spheres of electricity and gas and that in this definition not the public but somebody else (smelling strongly of gas) would have the say.

It is feared that any such "definition" would have a very serious effect upon an industry whose friends at court do not seem to carry so much weight as those of other parties. Small wonder, then, that members of an Association whose aim is to

develop and encourage the use of electricity should look askance at "co-operation" which may mean serious retrogression.

They must, however, be fair and not refuse to co-operate in any way likely to benefit the public. We are sure that they will not, but they very properly demand first to be told the nature and scope of the suggested co-operation.

The Companies' Part

IT is indicative of the trust placed in the Electrical Development Association by supply authorities that even in a period of "undevelopment" there was an increase of six in the membership in 1942, and one of the six was the Yorkshire Electric Power Co., whose accession is a very weighty addition. Moreover, since the close of the year the Lancashire Electric Power Co. has decided to join up. It may be hoped that these examples will encourage one or two of the larger municipal authorities who have seceded to return to the fold.

The E.D.A. Directorship

IT is certain that after the war E.D.A. will enter upon a period of extremely intensive and extensive activity, and it will be no easy job for the man in charge of its many-sided work. Therefore, no disparagement of Mr. A. C. Cramb's outstanding abilities is implied by the Council's decision to allow him to make room for a younger man. Mr. Cramb was in at the beginning of E.D.A. and for the past twelve years has been director. In this period the Association's activities have been very considerably extended, as may be gauged from the fact that the staff was doubled between 1931 and the beginning of the war. At the annual meeting Mr. Hoadley promised that the Council would exercise the greatest care in the appointment of a new director and, he added, they were prepared to pay properly for the proper man.

Standardisation and Design

How far should standardisation of electrical appliances go? The main considerations are efficiency and interchangeability of parts to facilitate replacement. Once these meritorious ends have been achieved, is there any real need to go further and stereotype externals? To most people this will seem most undesirable; they have varying tastes and will want some freedom of choice. Indeed if the choice is not available they may look elsewhere. Appliance makers, too, will desire to be given freedom in this matter and so be able to retain that individuality without which there may seem to be little reason for their separate existence.

Definitions

SECTION 2 of the revised "Glossary of Terms Used in Electrical Engineering" (BS 205-1943) now available from the British Standards Institution (2s. net) covers machines and transformers. The extent of the changes from its predecessor (1936 edition) cannot be gauged by an increase of fifteen terms. Those relating to instrument transformers, which are to appear in Section 4, have not been included and other terms not required in modern practice have been omitted. On the other hand, room is found for such widely used expressions as repulsion, repulsion-induction and universal motors, while Ward-Leonard and Ilgner systems, metadyne generators and convertors, the oil-conservator and the Leblanc transformer connection receive the recognition due to them.

Preferred Terms

ALTERNATIVE terms are included in the Glossary, but the aim is their ultimate disuse. For that reason the promotion of "synchronous capacitor" to first choice instead of "synchronous condenser" is to be welcomed. "Arc-suppression coil" is preferred to "Petersen coil," and allows for modifications of the original principle. "Compole" retains priority over "commutating pole," although the latter is probably as widely used and is free from suspicion as jargon. No regret is likely to be felt on account of the dropping of the word "neutralator" as a runner up of "earthing reactor."

Carry Over

THEORIES vary as to the several causes and the nature of the solids carried over from boilers to be deposited on turbine blades, causing loss of output among other evils. During a recent discussion of water treatment by the American Society of Mechanical Engineers it was stated that these deposits occur chiefly on convex surfaces and at points of sharp changes in steam pressure, but that an obstacle to

determining their composition had been the modification in their character due to steam washing. It is to be hoped that the radical investigations to be made by the Edison Electric Institute will remove some of the obscurity that now surrounds the problem.

Education for Industry

THE undesirability of terminating general education suddenly and altogether on leaving school for the workshops was perhaps the most important aspect of early training discussed by Dr. P. Dunsheath in his lecture to the A.S.E.E. last week. The question arises as to whether one day a week at a continuation school would be generally regarded as offering adequate compensation for a lower school-leaving age than that which would probably be proposed for legislation in the near future. It is worth considering whether a "fifty-fifty" division of time between workshop and school (entailing the employment of two boys on half time for each job) would not interfere less with manufacturing routine.

Engineering Wages

A SATISFACTORY compromise has been announced in the matter of the employees' claim and the employers' counter-proposals for increased wages in the engineering industry. The somewhat complicated award of the National Arbitration Tribunal raises the plain-time workers' pay by only 6s. a week, but in consolidating 20s. of the bonus in basis rates increases piece-workers' wages by raising the datum to which piece rates are referred in calculating the guaranteed minimum. Broadly the effect upon piece-workers' wages is to raise those of the lower-paid while making little difference to men at the higher levels.

Private Enterprise

LAST week we reported the remarks of Mr. Selwyn S. Grant at the annual meeting of the Provincial Electric Supply Association in which he deprecated political interference with electricity supply. Sir Alexander Roger, at the annual meeting of the Midland Electric Corporation for Power Distribution, referred to the trend towards public control of electricity distribution "mostly from incompletely informed sources" and showed that the public had much to thank private enterprise for in the matter of electricity supply. Mr. W. B. Shearer took a similar line when addressing the shareholders of the Midland Counties Electric Supply Co. last week. He said that any decision regarding control should rest on well-tried economic considerations divorced from political influence. This would avoid the dangers inherent in an over-planned regimented State, so far as electricity supply was concerned.

The Severn Barrage

IT had been generally thought that the plans for harnessing the power of the Severn had been shelved, but Lord Templemore assured the House of Lords last week that that was not so. The Government was merely anxious that any scheme of this sort should fit in with the general post-war reconstruction plan. The matter had been raised by Lord Brabazon, who was chairman of the Severn Barrage Committee which was set up in 1925 and reported in favour of the scheme in 1933. Many tides have ebbed and flowed since then and many more will dissipate their power before any electricity comes from the river; the Committee estimated the construction period at fifteen years, but Lord Brabazon now thinks that the work could be done in eleven.

Gas-filled Cables

IN a reference to the recent development of gas-filled cables working under a pressure of 35 lb. per sq. in. for 66 kV and at 200 lb. per sq. in. for higher voltages, the *General Electric Review* states that a reinforced lead sheath is used in the first case and a steel pipe in the second. It appears that the strength of a sheath construction falls considerably short of that required to withstand the higher pressure.

Political Control

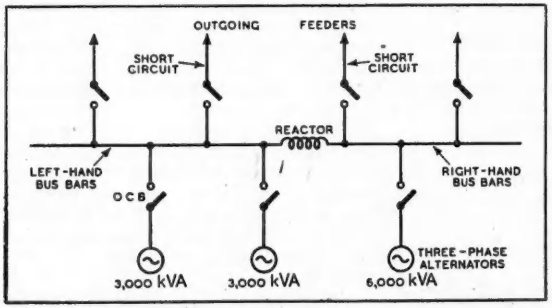
THE relinquishing by Dr. E. W. Smith of the post of Director of Gas Supplies in the Ministry of Fuel and Power has been followed by the resignation of several other members of his department. Commenting on the subject, "Janus" of the *Gas Times* says:—"To my mind the whole affair is a deplorable example of political control of industry." Well, the gas people always seemed anxious to have a Ministry of Fuel.

Reactors in Busbars

Their Effect on Circuit-Breaker Rating

By "Delta"

THE accompanying diagram shows how reactors for limiting short-circuit currents and reducing the breaking duty of existing oil circuit-breakers can be included in a straight busbar run. Such a method is often adopted for small installations as it permits extensions to be easily made. At full load the interchange of current between the sections should be a minimum. On the other hand, if large currents have to flow through the reactors, then these should have a fairly low reactance to permit proper parallel running. The normal transfer of power does not take place by drop in voltage but by phase displacement between the voltages of the busbar sections. At light loads certain of the reactors can be by-passed by oil circuit-breakers. Under these conditions, a smaller number of generators will be connected to the busbar and the short-circuit currents automatically limited. The voltage of the section upon which the "short" takes place tends to fall to zero, while the voltage of the other bus section is progressively higher the further the busbar is from the short-circuit. Only a limited number of consumers is thus affected.



Single line diagram of connections of power system with reactor in busbars to limit the short-circuit kVA capacity

To appreciate the effect of including a reactor in a main busbar run, calculations should be made of the short-circuit kVA, first without and then with the reactor installed. For example, assume that two 3,000-kVA alternators are installed initially with breakers having a capacity of 75 MVA and that due to increased loading a third alternator of 6,000 kVA has to be installed. Without the reactor, the rupturing capacity required would be approximately 90 MVA. This value can be calculated by taking a base kVA of 10,000 and converting all the machine reactances to this base.

If the 3,000-kVA alternators have a reactance of 13 per cent., the value at 10,000 kVA in each case will be $10,000 \times 13/3,000 = 43$ per cent. For the 6,000-kVA machine which has a reactance of 14 per cent., the basic equivalent reactance will be $10,000 \times 14/6,000 = 23$ per cent. The total percentage reactance of all machines in parallel will be obtained from $\frac{1}{X_T} = \frac{1}{43} + \frac{1}{43} + \frac{1}{23}$ or $X_T = 11{\cdot}2$, so that the short-circuit capacity is $10,000 \times 100/11{\cdot}2 = 90,000$ kVA. Thus, it would not be safe simply to extend the busbars and install the new alternator without first increasing the rupturing capacity of the circuit-breakers or, alternatively, providing a current-limiting reactor in the busbars and connecting the new alternator to the right-hand section.

Assuming the reactor to be rated at 4 per cent. at 2,000 kVA, find the short-circuit on the left-hand section first. The equivalent reactance of the two 3,000-kVA alternators in parallel is $\frac{43 \times 43}{43 + 43} = 22$ per cent. on a 10-MVA base and the equivalent reactance of the reactor is $10,000 \times 4/2,000 = 20$ per cent. The reactor and 6,000-kVA alternator are in series giving a reactance of $20 + 23 = 43$ per cent. The latter value is now in parallel with the two 3,000-kVA machines, and the total reactance is obtained from $\frac{1}{X_T} = \frac{1}{43} + \frac{1}{22}$ or $X_T = 14{\cdot}6$ per cent. Therefore the short-circuit kVA on the left-hand side is $10,000 \times 100/14{\cdot}6 = 69$ MVA, and can be coped with satisfactorily by the existing oil circuit-breakers rated at 75 MVA.

For the right-hand section the equivalent reactance of the two 3,000-kVA alternators in parallel will be 22 per cent., and with the reactor, the total reactance becomes $22 + 20$ or 42 per cent. This reactance is then in parallel with the 6,000-kVA alternator, making a total reactance of $\frac{42 \times 23}{42 + 23}$, *i.e.*, 15 per cent., the short-circuit power being $10,000 \times 100/15 = 67$ MVA. Consequently, the oil circuit-breakers on this section can also have a short-circuit capacity rating of 75 MVA.

Development in 1942

E.D.A. and the Fuel Economy Campaign

MAJOR G. LLOYD GEORGE, Minister of Fuel and Power, was the guest of honour at the annual luncheon of the British Electrical Development Association on March 19th. The President, Alderman A. A. Senington (Bristol), took the chair and the company, numbering over 500, included leaders of all branches of the industry.

After the loyal toast, Major Lloyd George proposed "The British Electrical Development Association." In the course of his speech he expressed his thanks to E.D.A. for its valuable assistance in the Fuel Economy Campaign, mentioning especially the work of Messrs. A. C. Cramb (director), E. E. Hoadley (chairman) and V. W. Dale (business manager). He said that electricity supply authorities had freely offered their showrooms for demonstrations and lectures and had provided experts to give advice on fuel economy in houses, factories and schools.

Thanks to this assistance the results of the campaign had been remarkable. In April, 1942, the consumption of coal for the generation of electricity was 12 per cent. in excess of that for the corresponding month of 1941. By December that excess had been reduced to 1 per cent. Although it had been said that the success of the campaign had been largely due to the mild weather, Major Lloyd George pointed out that up to December temperatures had followed the normal course. They had not merely relied on a fine winter, for plans had to be laid well in advance; even now they were making preparations to meet the heavier demands of next winter. He thought that in this matter E.D.A. had given a real meaning to the term "public utility."

Hitherto he had been compelled to devote most of his attention to coal until he felt like the waiter in *David Copperfield* who "lived on broken wittles and slept on the coals." But he was Minister of Fuel *and* Power and power was as important. The future of this country was bound up with the use of electricity. He mentioned a speech which he made twenty years earlier in which he had advocated larger and fewer power stations, water-power development and increased trunk mains. He had seen these things come about and he hoped that the electrical industry would follow his recommendations as Minister as well as it did his suggestions of twenty years ago.

Major G. Lloyd George

The Ministry's purpose was to make the best possible use of the nation's resources. The post-war task would be tremendous and the electrical industry was bound to play a big part. This was particularly the case in rural development; the expansion of the agricultural industry must be one of the most important items in reconstruction if we were to have a balanced economy. The improvement of rural electricity supply was long overdue.

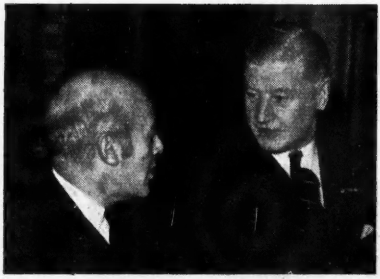
Housing was another important factor. The housewife's task must be lightened, and although the electrical industry had done much already it could do much more. We would have to build thousands of houses and they must be equipped for any form of service—gas, electricity or solid fuel.

Gas and electricity had had many tussles, but now there must be co-operation between them. We would not get the best if there were an internecine struggle. The two industries must be complementary, not antagonistic. With such co-operation we could look forward to the future with confidence.

Alderman A. A. Senington (President) and Mr. E. E. Hoadley (Chairman of Council) greet Mr. H. J. Randall (City of London Electric Lighting Co.)

Replying to the toast, Alderman Senington said that the pledges given by E.D.A. that it would fully co-operate in the fuel campaign had been implemented, as Major Lloyd George's remarks had shown. They were not antagonistic to gas but they asked for fair play and if the differences were recognised there could be co-operation. The war had proved the invaluable services of electricity to the country and electricity had secured the public confidence.

Mr. Tom Smith, Parliamentary Secretary to the Ministry of Fuel and Power, with Lord Brabazon, the new President



Cdr. Stephen King-Hall and Sir John Dalton

At the showrooms people had been satisfied that electricity could be useful to an extent which they had not dreamed of before and demonstration kitchens had shown what could be done in the way of electric cooking.

After the war thousands of women would be returning from the Services and the factories with a greatly-increased appreciation of electricity and they would not be satisfied with pre-war standards. Electricity could bring them freedom from drudgery and they would demand it and there would be greater possibilities than ever before.

Electrical people wanted to be "good neighbours" but they expected that spirit to be reciprocated. He reaffirmed the industry's support of the Ministry. They did not desire to trespass but electricity must have its possibilities made more plain in post-war homes.

Electricity could be spread over the country areas to a far greater extent than at present and, altogether, everybody should be optimistic regarding electricity's future.

He concluded by reiterating that all that electricity asked for was a fair field and no favour.

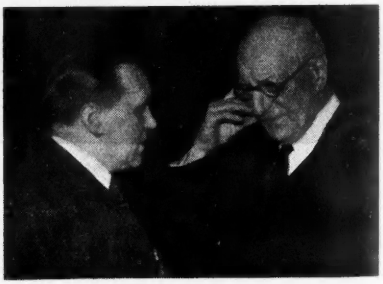
Annual Meeting

Alderman Senington presided at the subsequent annual meeting and called upon Mr. E. E. Hoadley to move the adoption of the accounts. Mr. Hoadley explained that although there was a "paper" deficit, about £4,000 had been recovered from income tax, resulting in a balance of about £400 on the right side. They had only called for 25 per cent. of the normal subscriptions but they hoped this year to usefully spend up to 50 per cent. of the normal amount.

In seconding the motion, which was carried without dissent, Councillor G. W. H. Luck said he hoped that after the war they would usefully spend more than 100 per cent. of the normal subscriptions to maintain and improve the industry's position.

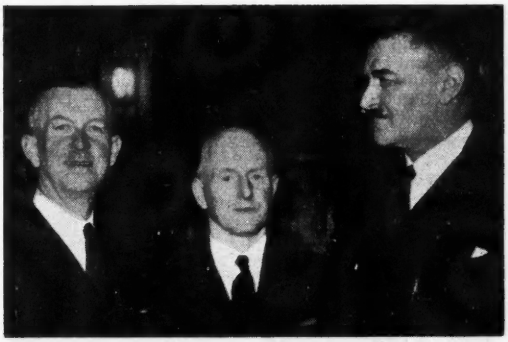
In moving the adoption of the report (which is dealt with at the end of these notes), Mr. Hoadley said that the large difference between the revenue from municipalities and companies was being very materially rectified. He also mentioned that a number of the E.D.A. films had been accepted for exhibition in schools. The mutual aid schemes sponsored by E.D.A. had accomplished a great deal of good as he could testify from his personal experience.

Referring to the work of the Electric Cooker Committee, under the chairmanship of Mr. F. Newey, he said that it was endeavouring to arrange for the interchangeability of the vital parts of cookers. He did not think that many members wanted to go much further than this at the present time.



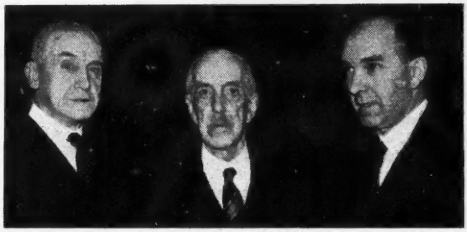
Sir Johnstone Wright and Sir Thomas Purves

A member, referring to Major Lloyd George's call for co-operation with the gas industry, thought that the meeting should express its opinions on this subject. They should fight for the electrification of all buildings. Another member said that it should be compulsory to to install power circuits in all new houses. Mr. Hoadley said that the Council had pressed this point and would continue to do so.



Mr. C. T. S. Arnett (Central Board), Mr. E. Jones (Cardiff) and Mr. H. E. Blackiston (Swansea)

In reply to Mr. J. W. J. Townley, Mr. Cramb said that evidence on electricity in new houses had been prepared for England and Wales and members of the Scottish Area Committee had been given copies to pass on with their suggestions to the Scottish Housing Committee.



Mr. B. C. Baird (Dundee), Baillie James Edward (Edinburgh) and Mr. J. Eccles (Edinburgh)

Alderman Coates said that Major Lloyd George had stressed the need for electricity in rural areas when gas could not undertake this unremunerative work. Electricity should be given a "*quid pro quo*" in concentrated areas. Mr. Hoadley said that it would be made plain that rural electrification would have to be paid for.

Mr. F. N. Rendell-Baker (Croydon), Mr. R. Illingworth (Poplar) and Mr. H. Pryce-Jones (Brighton)

A proposal by Mr. H. E. Blackiston that the industry should decline to co-operate with the gas industry at all failed to find a seconder. Alderman Mrs. Gregory considered that more should be done to counter gas activities. Women had made up their minds that they wanted labour-saving homes.

Mr. Hoadley then referred to the reorganisation of the Association which had been embarked upon with a view to doing the utmost during the war and extending activities afterwards. He said that Mr. Cramb had passed retiring age and it was felt that he should not be burdened with the work of reorganisation. It was proposed, therefore, to bring in a new director in the near future, and Mr. Cramb, who had done wonderful work for E.D.A. and the industry would retire on terms which he had agreed were generous.

In making the new appointment, the Council was determined to exercise the greatest care. It was out to get the best man and was prepared to pay a proper price. The Chairman emphasised that E.D.A.'s work was confined to extending the utilisation of electricity; it had nothing to do with distribution or reorganisation;

moreover, it was neither company nor municipal. Although it was said that the industry did not possess a single voice, Government Departments or others could get a single answer from the Association to all utilisation questions.

Messrs. E. A. Barker (Barnsley), F. Nicholls (Leeds) and F. Newey (President, I.M.E.A.)

A suggestion that the matter of the appointment of a new director should be deferred for three months was not proceeded with. It was pointed out that the Council had full powers to make such an appointment.

Mr. Hoadley then reported the election of Lord Brabazon of Tara as president for the ensuing year; the re-election of Alderman Dudley Stuart as vice-president for a further year; and the election as vice-presidents for three years of Alderman Mrs. E. Gregory, Alderman A. Critchley, Sir John Dalton and Mr. Selwyn Grant.

Alderman Senington paid a tribute to the work of Mr. A. C. Cramb during his 28 years at Croydon and 12 years with the Association. He said that since Mr. Cramb became Director activities had greatly increased and the staff had been doubled up to the outbreak of war. He asked Mr. Cramb to accept as a token of their regard a cheque for £140 which had been subscribed by the members of the Council and of the Area Committees.

Messrs. A. J. C. De Renzi (Newcastle-under-Lyme), T. A. G. Margary (Wolverhampton) and E. A. Newburn (Walsall)

In thanking Alderman Senington, Mr. Cramb said that he had been in the industry nearly from its beginning. The low salaries and long hours of the earlier days had been compensated for by the feeling that they were doing a good work. He had started the fight for selling powers for the municipal authorities and although that had brought him into conflict with the Electrical Contractors' Association he had remained on good terms with the contractors. He thanked members for their kind wishes and their help during his directorship.

Lord Brabazon, in thanking members for his election as president, said he thought that if he took Major Lloyd George's remarks to heart it was his duty to lead the industry into bankruptcy. He intended to be an active president during his year of office.

Sir John Dalton proposed a vote of thanks to Alderman Senington which was seconded by Mr. F. Newey, and Mr. A. J. Fippard thanked Mr. Hoadley for his services during the past year, seconded by Mr. A. J. Newman.

The proceedings terminated with a vote of thanks to the technical Press and officers of the Association, proposed by Mr. G. M. Daniels and seconded by Mr. F. H. Pooles.

It was ascertained after the meeting that Mr. V. W. Dale has been appointed assistant director of the Association and that Mr. Hoadley has been re-elected chairman of the Council.

Annual Report

During 1942 the membership was increased to 396 by the joining-up of the Yorkshire Electric Power Co., the Barking and Luton Corporations, and the Ascot, Pontypool and Sedbergh Companies; in addition the Lancashire Electric Power Co. decided to become a member as from January 1st, 1943. The revenue from supply authorities, including the Central Board, was £29,533 (against £29,576 in 1941), subscriptions being again at 25 per cent. of the normal rate.

In conjunction with the supply authorities, the Association assisted the Ministry of Fuel

and Power in conducting the Fuel Economy Campaign. Mr. E. E. Hoadley, chairman of the Council, was in frequent contact with the Ministry and also represented the electricity supply industry on the Fuel Economy Planning Committee. Mr. V. W. Dale represented E.D.A. on the Ministry's Committees. The assistance given to the Ministry included advice on national advertising ; the preparation of material for films and broadcasts ; participation in the organisation of Ministry of Information exhibitions in London, Manchester and Leeds, as well as over 150 local exhibitions ; regular re-issue of official advertisements to members ; and co-operation in a schools campaign on fuel economy and fuel uses. Since the beginning of the campaign the Association has distributed 35 million items of publicity matter.

The Association has also worked with the Fuel Efficiency Committee in the consideration of methods by which factories might save electricity without decreasing production.

Continued assistance was given in the Ministry with Government Departments and manufacturers in order to secure the greatest possible production of essential replacement parts. But the supply has not kept pace with the demand and new methods have been developed to enable supply authorities to do repairs in their own workshops. This has been supplemented by Technical Service Data recording the latest practical experience in the repair and maintenance of cooking equipment.

The Electric Cooking Committee appointed a sub-committee to provide for the exchange of experience in wartime maintenance problems and, with a view to lower maintenance costs, to prepare detailed proposals for greater interchangeability of the wearing parts of cookers.

Further editions of the Register of Surplus Stocks were issued. The demand for domestic appliances greatly exceeded the supply and the stocks available consisted of motors, transformers, etc.

The Association is taking part in post-war planning discussions and has assisted in the

Members of E.D.A. staff now serving in the Forces, with Mr. E. M. Hood. Left to right : Capt. Prowse, Squadron-Leader Hawkins, Squadron-Leader Steadman, Mr. Hood and Capt. Parkin

of Food's campaigns. About 300 supply authorities maintained Food Advice Bureaux, to which the Association has issued regular bulletins; over 400 co-operated in the " Recipe for the Week " radio and Press campaign ; and 550 displayed official notice boards. At the Association's request, supply authorities provided facilities and staff for Ministry of Food demonstrations.

Through its contacts with the Ministry of Information, the Post Office and the British Red Cross, the Association helped members to maintain attractive window and showroom displays and 10,000 displays were circulated.

The E.D.A. films were seen by at least two million people during the year and additional copies had to be printed to meet the increased demands. A revised edition of " Modern Factory Lighting " was issued and permission was given to the Government of India to reprint and circulate the book in that country. Progress was made with the consolidation and extension of Mutual Aid Groups for which the Association, with the encouragement of the Electricity Commissioners, had accepted responsibility. Special attention has also been given to the training of kitchen staffs in view of the increased use of electric cooking equipment in factory canteens, British Restaurants etc.

The necessity for keeping domestic apparatus in good order led the Association to negotiate waste-paper recovery campaign and the Electrical Industries Red Cross Appeal.

In a reference to the move of the Building Centre to Maddox Street, W., the report says that a temporary exhibit representative of all sections of the electrical industry and the Post Office is being prepared.

Mention is made of the work of the Electric Vehicle Association of Great Britain. The manufacturers co-operated in the production of a specification for a one-ton vehicle. It was anticipated that sanction would be given to the construction of a considerable number of these vehicles and the building of prototypes was begun. On account of prior war requirements, however, the Ministry of War Transport has deferred permission to construct the vehicles in quantities.

The notes on the work of the Electrical Association for Women refer to the mobile canteens, certificates and diplomas, youth organisations, food and fuel, etc.

The income and expenditure account in general varies little from that of the previous year. An analysis of expenditure, which totalled £33,669, shows the principal items to be advertising towards the public, display publicity and general Press work 31·6 per cent.; publicity towards the public and industry, reports and statistics 17·1 per cent.; Area Committees 23·0 per cent.; and subscriptions 11·0 per cent.

Meter Standardisation

Desirable Reforms in Two Stages

THE standardisation of integrating electricity meters is proposed in a paper by Mr. C. W. Bridgen (Ferranti, Ltd.) prepared for the Measurements Section of the Institution of Electrical Engineers.

It is pointed out that various B.S.S. have brought about some degree of standardisation in relation to performance, amperage rating, terminal markings and clock trains, but there has not been any attempt to limit the size or shape of components or of the complete meter itself. It has not been possible to do so hitherto mainly because of the large number of manufacturers and the even greater number of users who have their own models and ideas about how they should be designed. Yet most modern house service meters are made to the same basic design.

At the moment fifteen makes are produced in this country; their outline dimensions vary considerably, but the more one examines the possibilities of a simple attempt to standardise fixing centres and terminal blocks, the more one is led to the conclusion that the only solution of the problem is the complete standardisation of all meter components (which the author discusses in some detail) to permit one standard model to be made.

The alternative is a service unit capable of accommodating a variety of types of meter, such as has been produced by a number of manufacturers for use in this country and abroad, with possibilities of improvement on the lines adopted on supply authorities' test benches.

Representative Committee Suggested

The author suggests the appointment of a committee, representative of the managerial sides of both the supply authorities and manufacturers, to examine the general desirability of an agreed general specification for a single-phase meter for quarterly account consumers. It should be of standardised external shape, including fixing centres and terminal block, but allow for some latitude as regards individual design of internal components. Three sizes of 5, 25, 50 A, with an overload capacity of twice the rated load, will satisfy all requirements at first, to be reduced later to two basic ratings with increased overload capacity. The author hopes there will not be any recurrence of former striving for super-accuracy in commercial grade meters at low loads.

It should be possible to standardise the gear train, bearings (most important item), disc, torque and speed without too great an encroachment on individual makers' preferences. Complete standardisation of all component parts can only be carried out under full control and direction by the Government of both makers and purchasers, while it is difficult at this stage to suggest what form the standard meter should take. The author has not much to say about prepayment attachments.

The first step in standardising polyphase meters will be adoption of the single disc construction, using either an insulated centre, or a laminated disc, for localising eddy currents under their own driving element. This will enable designers to produce a polyphase model more nearly like the single-phase type in size, with standard outline dimensions, fixing centres and terminal arrangement.

Present-day Limit

While it is apparent that some degree of standardisation is necessary, the author concludes that it must be approached in two stages, dealing first with terminals and fixing centres and secondly with outline dimensions, bearings and, later, speeds. In his opinion the second stage is the maximum degree desirable at present. It will help the user considerably by easing the burden of maintenance and testing, yet leave the individual maker some scope for free design.

Domestic Refrigerators in America

ACCORDING to the U.S. Population Census there were 15,093,336 mechanical refrigerators in American homes at April 1st, 1940. This represented 43 per cent. of the number of occupied residences at that time (34,861,625) or 59 per cent. of the number of electricity consumers (25,647,717).

The term " mechanical refrigerators " includes those operated by electricity, gas and paraffin. The Edison Electric Institute's estimate of the number of electric refrigerators at the same date was 14,480,000, or 96 per cent. of the total. Since 1940 the number of electric refrigerators has probably risen to 19,280,000 and the number of all types of mechanical refrigerators to about 20,000,000, equal to 56 per cent. of the present total of occupied residences (35,400,000).

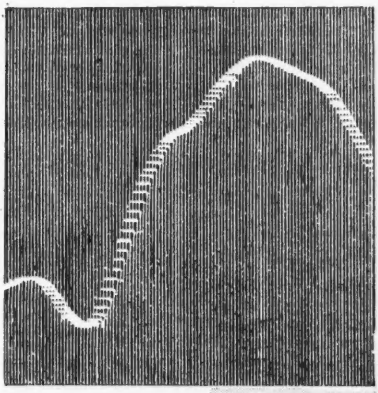
An analysis of the " saturation " of mechanical refrigerators in the various areas of the United States at the date of the Population Census is given in the *Edison Electric Institute Bulletin* for January. This reveals a wide variation, from 77 per cent. of occupied dwellings in the District of Columbia to 14 per cent. in Mississippi.

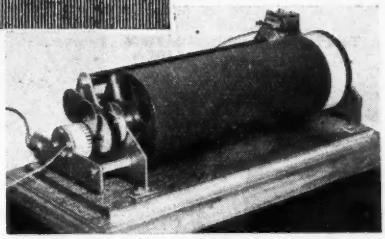
Frequency Variations

A Chart Recording Instrument

DIFFICULTIES in the adjustment of bulk-supply charges through the variation of supply frequency, the time interval being measured by a synchronous clock, led Mr. T. A. G. Margary, M.I.E.E., borough electrical engineer and manager of Wolverhampton, to develop and install an instrument by which a permanent record of the frequency variations is made.

The instrument comprises essentially a rotatable drum driven by a synchronous motor, *via* high-ratio reducing gear, from the source the frequency of which it is desired to record. Around the drum periphery is applied a recording chart upon which bears a stylus which is carried longitudinally along the surface of the rotating drum by means of a carriage mounted on a finely wormed rod also driven by the synchronous motor, with the result that a helical marking is produced along the chart. At the same time impulses from a standard clock are imparted to the stylus at regular intervals, so that the helical line is interrupted frequently.

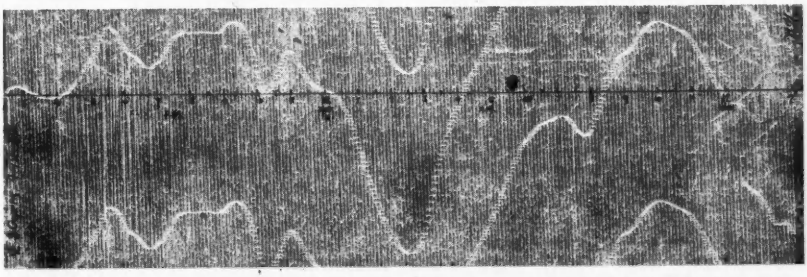




A small section of the chart, of natural size, showing the clarity of the recording, and (right) the recording instrument

As each revolution of the drum represents a convenient multiple of the frequency and the time intervals between the stylus impulses are equal, the interruptions will be in a horizontal line along the drum under strictly constant-frequency conditions, while departures from this straight line will thus represent frequency variations, a sloping interruption line in one direction representing a rise of frequency and in the other direction a reduction with, of course, the same direction of rotation of the drum. Thus a waving interruption line will represent a frequency varying both ways. The mean frequency during any interval of time, then, is represented by the angle of displacement from the horizontal (declared frequency) line, and the frequency can be easily determined by measuring with a suitable scale the vertical distance between the first and last mark of the desired interval of time.

To facilitate reading, the stylus arm may be



The mean frequency is represented by the angle of displacement from the horizontal (declared-frequency) line of a line of successive interruptions

given a special movement, say, every half-hour, to produce a time-indication mark on the chart. The advantage of this instrument is that it is uninfluenced by voltage variation, wave form, temperature, transients, etc.

The accuracy of the instrument is that of the time clock employed, which need not be an expensive one, as quite an ordinary clock will keep time to within seven minutes a week, which represents an error of 0·069 per cent.

Air-Break Switchgear

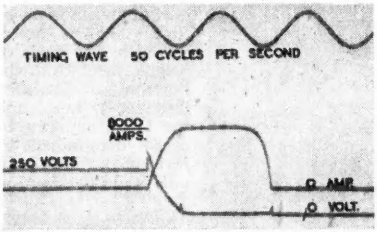
Tests on a New Design

ONE of the oil-less circuit-breakers developed by Dorman and Smith, Ltd., for use on AC or DC circuits with duties up to 2,000 A at 660 V was recently inspected by us in a substation of a London supply undertaking. The model in question was designed for 200 A and had been tested on a 400-V three-phase system of a large under-taking connected to the N.W. England grid. The report of this test indicates that the breaker successfully cleared 38,000 A per phase at 400 V, or more than 25 MVA.

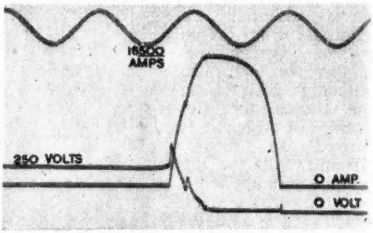
The same breaker was subjected to DC rupturing-capacity tests at the National Physical Laboratory, where the maximum currents (double- and single-pole) obtainable from the battery were applied, *viz.*, 10,000 A at 520 V and 16,500 A at 250 V. The short-circuits, we are informed, were cleared without signs of distress or need to renew parts, and it appeared that much greater short-circuits could be coped with satisfactorily.

The breaker we saw was mounted on a "Sindanyo" panel, 20 by 14 in., and its maximum projection was 8½ in. Closure is by means of a downward movement of a free-handle mechanism incorporating a toggle held in by a catch, which when tripped causes the breaker to open instantaneously, so that the contacts cannot be held together against excessive overloads. As the toggle is fixed to the closing bar, one mechanism will operate any number of poles.

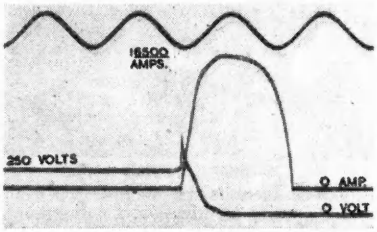
The main brush, of laminated copper strip, is secured by a V-shaped anchorage, which eliminates rocking and can be easily adjusted or removed. The arcing tips and shields also are readily taken apart. The visible overload adjustment is fitted with a locking device and time lags can be adjusted between 0 to 10 sec. on 25 per cent. overload. Instantaneous tripping occurs with 500 per cent. overload. The no-volt coil is self-resetting. The breakers comply with B.S.S. 862–1939 and Lloyd's requirements. Temperature rise on conductors is half the B.S.S. minimum values.



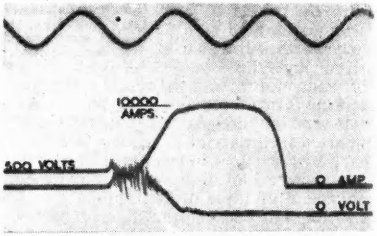
Test No. 1. Double-pole, 250 V. Prospective current 8,000 A



Test No. 2. Double-pole, 250 V. Prospective current 16,500 A



Test No. 3. Single-pole, 250 V. Prospective current 16,500 A



Test No. 4. Single-pole, 500 V. Prospective current 10,000 A

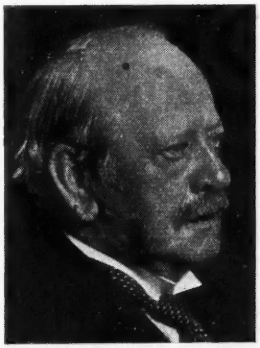
Biography of J. J. Thomson

Early Interest in Science

Reviewed by **J. D. Cockcroft,** Ph.D., M.Sc.Tech., F.R.S., M.I.E.E.

THE Life of J. J. Thomson by Lord Rayleigh* provides us with a fascinating and a worthy record of a great man of science.

J. J. Thomson was the son of a Lancashire bookseller. At an early age his mind was set on science—Lord Rayleigh quotes a story of his saying at a family party that he intended "to go in for original research" and being told "not to be such a little prig, Joe." At the age of fourteen Joe was sent to Owens College and was there a pupil of Balfour Stewart and Osborne Reynolds. By twenty he had published his first paper—on contact electricity—in the Royal Society Proceedings. In the same year he was diverted from locomotive engineering to enter Trinity College, Cambridge, as a mathematical scholar. He attended the lectures of Stokes, Cayley and Adams and came out as Second Wrangler in the Mathematical Tripos, Joseph Larmor being Senior.



Sir Joseph Thomson, who died on August 30th, 1940, at the age of eighty-three

Shortly afterwards he entered the Cavendish Laboratory where Lord Rayleigh had just succeeded Maxwell as Cavendish Professor. Here "J. J." was initiated into the then popular pursuits of measuring the ratio of the electrical units or of determining "v," the velocity of light. Three years later by his mathematical work he had won recognition and on Lord Rayleigh's resignation in 1884, he was appointed, at the age of twenty-eight, to the Cavendish Chair. By 1892 he was interesting himself in the velocity of propagation of electrical discharges down a tube and inventing the electrodeless discharge. The discovery of X-rays by Röntgen in 1896 set the physical laboratories of the world afire and diverted "J. J.'s" researches to the path which has earned him enduring fame. He discovered that the X-rays could cause an electroscope to be discharged—the quadrant electrometer beloved of Kelvin was used to measure the currents causing the leakage and showed saturation with increasing voltage.

In partnership with Rutherford, then newly arrived from New Zealand and already in the full swim of research, he showed that the conductivity of air was due to conducting particles or "ions." He then turned to the study of the cathode rays whose properties had already received much attention from the time of Crookes onwards. They had been shown to carry a negative charge and to be deflectable by a magnetic field, but their nature as between particles and waves was still uncertain. "J. J." began by measuring the magnetic deviation of the rays by fields of known strength and from this went on to calculate the ratio of charge to mass on the assumption that they were particles. The results contained the unknown velocity of the particle. This was measured—first by measuring the energy of the rays and the charge carried, second by the technically difficult (for those times) experiment of deflecting them by an electric field. The surprising fact then emerged that the velocities were higher by far than those of molecular motion whilst the ratio of mass to charge was far less than for the ion carried by electrolysis.

Following on this the charge on ions was measured in the Laboratory by Townsend, using the miraculous method of the falling cloud, and was shown to be equal to the charge carried by the ion in electrolysis. The charges ejected by ultra-violet light from metals were then studied by "J. J." and shown again to be of the same magnitude, and their ratio of mass to charge to be the same as the cathode rays. These experiments taken together led to the triumphant conclusion that the cathode rays consisted of a stream of "corpuscles" whose mass was less than a thousandth of the hydrogen atom. So it was that the electron was born and Lord Rayleigh gives us a faithful picture of the progress of "J. J.'s" gropings and explorings towards the truth.

The peak of Thomson's scientific activities was reached in 1898. By this time he had built up a great school of physics, including Rutherford, C. T. R. Wilson and Townsend. In the years following, the pace of discovery was slower but still important. O. W. Richardson carried out his famous research on thermionic emissions and so prepared the

* Cambridge University Press. Price 18s.

way for the wireless valve. A second peak of discovery came about 1908 with " J. J.'s " work on " positive rays." When an electric discharge passes though a gas, positive rays travel in the opposite direction to the cathode rays and may be passed through a hole or canal in the cathode. " J. J." bent these by electric or magnetic fields and produced on a fluorescent screen or photographic plate the well-known parabolas which enable the ratio of mass to charge to be found.

The surprising discovery was made that the gas " neon " produced two parabolas. This foreshadowed the discovery of isotopes of the ordinary elements and the work of Aston who had now joined " J. J." Aston has said : " Working under him never lacked thrills. When results were coming out well, his boundless, indeed childlike enthusiasm, was contagious and occasionally embarrassing. Negatives just developed had actually to be hidden away for fear he would handle them while still wet. Yet when hitches occurred, along would come this remarkable being who, after cogitating in a characteristic attitude over his funny old desk in the corner and jotting down a few figures and formulæ on the back of an old envelope or even the lab. cheque book, would produce a luminous suggestion, like a rabbit out of a hat, not only revealing the cause of the trouble but also the means of cure."

When I joined the Laboratory, " J. J. " had become Master of Trinity and Rutherford reigned as Cavendish Professor. Yet though we owed allegiance to Rutherford, our lives were enriched by the presence of this friendly " Old Man of Science " who would grin at us or talk cricket or entertain us with characteristic " J. J." lectures.

Lord Rayleigh's book rebuilds for us a sympathetic and enjoyable picture of a great man and we are grateful to him for the memorial.

Work of the Red Cross

A SERGEANT-MAJOR who is a prisoner of war writes: " Hope and the Red Cross make life worth living to us here. They are our salvation of mind and body." These two sentences not only summarise the efforts made by the Red Cross and St. John Joint War Organisation for prisoners of war, but the word " salvation " crystallises both the urgent need for such efforts and the success that is attending them.

By the provision of regular food parcels to supplement deficiencies of diet, by the dispatch of books, games and sports equipment to combat boredom, by arrangements for educational facilities, by its special care for prisoners who are ill or blinded or deaf, the Red Cross has done much to earn such high praise and deep gratitude.

The services to prisoners of war have tended to overshadow the other great responsibilities which rest on the Red Cross and St. John, but as the war develops first one and then another aspect predominates.

During the heavy air raids in the past the Red Cross amplified the work done by official relief services in every conceivable way and was instrumental in saving hundreds of lives, bringing thousands back to health and restoring the faith of hundreds of thousands by little acts of comfort throughout the country. There is still a Luftwaffe. The Red Cross must stand prepared.

As for the future, who dare hope for final victory without a heavy increase in Service casualties ? The Red Cross must be, and is, ready to supplement basic medical treatment provided by the Forces, so that between base hospital and final recovery the wounded may look to it for that full measure of kindness, comfort and well-being to which they are entitled, and which many have already found in the Middle East.

Care for the children, assistance on a vast scale to our allies, particularly Russia, comfort for those who, safe themselves, have husbands or sons missing, prisoners or wounded—it is impossible briefly to summarise the great task of the Red Cross and St. John.

It is to help in this work that the Electrical Industries Red Cross Appeal was launched early this year, and as the lists of covenanted subscriptions and donations which we have published show, it has received good support. Subscriptions and donations should be sent to the Electrical Industries Red Cross Fund, St. James's Palace, S.W.1, and correspondence should be addressed to the joint secretaries at 2, Savoy Hill, W.C.2.

Power Engineers' Salaries

CLAUSE 43 of the schedule of salaries of the National Joint Board of Employers and Members of Staff for the Electricity Supply Industry provides that an employee whose duties and responsibilities are increased by the operation of a power station in parallel with the Central Electricity Board's system may claim a higher salary, to be determined by the District Joint Board. At a meeting in February the N.J.B. decided that it should not be competent for a charge engineer in a station in Class J or over to make a claim under this clause.

It may be recalled that charge engineers in Class J and larger stations were " promoted " to Grade 7 of the schedule last year.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE *London Gazette* of March 11th announces the award of the George Cross to **Captain (temporary Major) C. A. J. Martin,** M.C., B.A., for most conspicuous gallantry in carrying out hazardous work in a very brave manner.

Major C. A. J. Martin, G.C., M.C.

Major Martin was awarded the Military Cross during the last war for gallantry in dealing with a fire in an ammunition store. In 1919, he returned to Cambridge and completed his studies. He later entered the electrical engineering profession and became an associate member of the Institution of Electrical Engineers. He is a member of the London staff of Crompton Parkinson, Ltd., and, volunteering in 1940 to rejoin the Services, was given a commission in the Corps of Royal Engineers.

Lord Brabazon of Tara, who is president of the British Electrical Development Association for 1943-44, was raised to the peerage about a year ago. He was probably better known as Lieut.-Col. J. T. C. Moore-Brabazon and as Parliamentary Secretary to the Ministry of Transport when the 1926 Electricity (Supply) Act was before the House of Commons. He was also chairman of the Severn Barrage Committee, which was appointed in 1925 and reported in 1933. He was Minister of Aircraft Production in 1941.

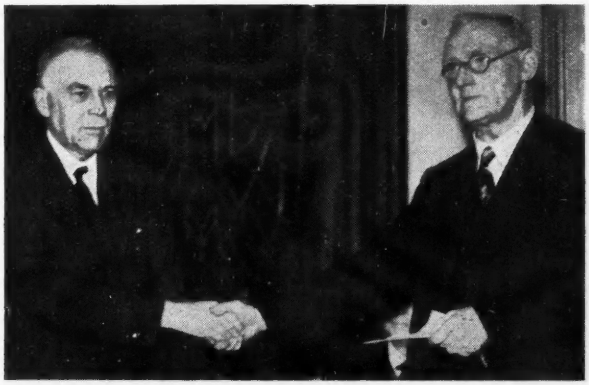
Lord Brabazon, who has expressed his determination to be an active president of E.D.A., joined the board of the County of London Electric Supply Co. last year. He is also a director of Electric & Musical Industries, Ltd.

The impending retirement of **Mr. A. C. Cramb,** director and secretary of the British Electrical Development Association, will afford a well-merited rest to one who has spent the greater part of his life in the service of the electrical industry. His connection with electricity supply began towards the end of last century, when he occupied posts at Islington, Huddersfield and Hampstead. But it was at Croydon that he did his principal work. He joined that undertaking in 1902 as chief assistant and two years later became chief engineer and manager, a post which he held for about twenty-six years. During this period the Croydon system was built up on a solid foundation and considerably extended and Mr. Cramb acted in an advisory capacity to the Tramways Department as well. He also effected considerable improvements in the borough's street lighting. During the last war he was district engineer to the Metropolitan Munitions Board and in that position was responsible for the production of large quantities of war material.

His activities in connection with the Incorporated Municipal Electrical Association made him a well-known figure in electricity supply circles. He was president of the I.M.E.A. in 1916-17 and after serving as hon. treasurer became hon. secretary in 1919. He was responsible for the organisation of a number of successful annual conventions, a task entailing a good deal of hard work. Mr. Cramb has also been active in a number of other directions. He has been president of the Institution of Public Lighting Engineers and has served on the Councils of the I.E.E., the British Standards Institution, and E.R.A.

He was a member of the Committee set up by the Electricity Commissioners in 1925 to advise them upon the subject of domestic supplies and of the Commissioners' Committees on uniformity of systems and tariffs which reported in 1930. He was an advocate of appliance-selling powers for municipal authorities and became a member of "Committee D" appointed to deal with this matter under Clause 48 of the 1926 Electricity (Supply) Act.

Mr. Cramb has been connected with E.D.A. from its start. He served on the Council and Executive Committee for some years and was chairman in 1928. He succeeded Lt.-Col. W. A. Vignoles as director and secretary in



Alderman Senington (president) presenting Mr. Cramb with a cheque at the E.D.A. annual meeting. **(See report on page 412)**

December, 1930, and has thus occupied the position for over twelve years. His period of service has been marked by a tremendous increase in the Association's activities and an equally great increase in the influence of E.D.A. in national affairs. He will carry with him the best wishes of the electrical industry for many happy years of retirement and its thanks for his lifelong devotion to the electrical cause.

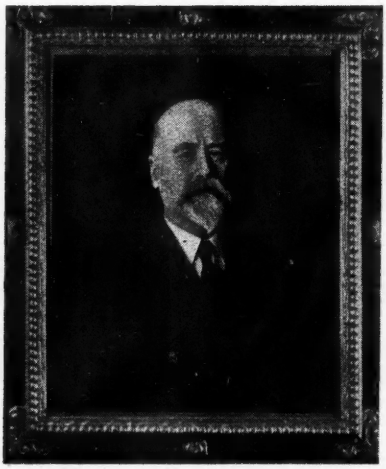
The announcement that **Mr. V. W. Dale** has been appointed assistant director of the British Electrical Development Association will be a cause for gratification to all who know how much work he has put in for the spreading of electrical service as business manager of the Association.

Mr. V. W. Dale

Mr. Dale who had been at West Ham with Mr. J. W. Beauchamp, the first director of E.D.A., joined his chief at the inception of the Association and the success achieved has been largely due to his unremitting activities.

Probably his most notable work has been the organisation of exhibitions all over the country which has gained him a wide circle of friends. Lately he has devoted a great deal of time and energy to the running of food and fuel exhibitions, the waste-paper recovery campaign and the Electrical Industries Red Cross Appeal.

A portrait of **Mr. Walter Riggs,** president of the Electrical Contractors' Association, by Mr. J. A. A. Berrie, R.C.A., has recently been hung in the boardroom of the Association's headquarters, Africa House, Kingsway, W.C.2. It was the gift of members of the Council and some of the past-presidents of the E.C.A.



The portrait of Mr. W. Riggs at the E.C.A. headquarters

Lord Meston has resigned the chairmanship of the Calcutta Electric Supply Corporation, Ltd., owing to ill-health, but retains his seat on the board. He is succeeded as chairman by **Sir James Donald,** the deputy chairman. Lord Meston is chairman of a number of companies, including the Galloway Water Power Co., Sudan Light & Power Co., W. T. Glover & Co., Wad Medani Light & Power Co., and the Wessex Electricity Co., and he is a director of the Urban Electric Supply Co.

The Minister of Supply has appointed **Mr. R. L. Prain** to be Controller of Quartz Crystals. On and from March 17th, all communications relating to the supply of quartz crystals should be addressed to the Controller at Portland House, Tothill Street, London, S.W.1 (telephone: Abbey 7788).

Mr. H. C. Parker, of the Metropolitan-Vickers Electrical Co., Ltd., has been nominated as chairman of the North-Western Students' Section of the I.E.E. for 1943-44.

Mr. F. W. Rowe

Mr. F. W. Rowe is to join the board of Kryn & Lahy (1928), Ltd., as managing director on April 1st. Until recently Mr. Rowe was on the board of David Brown & Sons (Huddersfield), Ltd., and was general manager of the company's Penistone works. He is well known to engineers and foundrymen for his work in the fields of engineering and metallurgy, and during his service of nearly twenty years with David Brown & Sons (Huddersfield), Ltd., he has been associated with many of the company's developments.

Our contemporary, the *New Zealand Electrical Journal* informs us that **Lieut. Lewis King,** of the destroyer *Onslow,* has been awarded the D.S.C. Prior to service afloat Lieut. Lewis King was advertising manager of that journal.

Col. J. A. Saner, C.B., V.D., who has been associated with the Mid-Cheshire Electricity Supply Co., Ltd., since 1900, and was chairman from 1903 to 1942, is to retire from the board for health reasons.

Mr. G. A. Proctor, sales manager of the Manchester Corporation Electricity Department, is to retire. Mr. Proctor is sixty years of age, and joined the undertaking as office boy in 1896. He has occupied the position of sales manager for ten years.

Mr. H. P. Moss, chief electrical engineer of the Department of the Interior, Australia, has been appointed Commonwealth Controller of Electricity Supply.

Mr. N. L. Goodchild, Director for Pig Iron, has also been appointed Director for Electrodes. Mr. Goodchild joined the Iron and Steel Control immediately on the outbreak of war from the Stanton Ironworks Co., Ltd.

Mr. A. H. Sherry, managing director of E. Sherry, Ltd., has been appointed a director of the Airscrew Co., Ltd., and its subsidiaries.

Mr. J. Davenport is resigning from the board of the Kalgoorlie Electric Power & Lighting Corporation as from the end of this month.

Obituary

Mr. H. A. Judge.—In our last issue we reported the death of Mr. H. A. Judge, chairman of Litholite Insulators & St. Albans Mouldings, Ltd. Mr. Judge's connection with the electrical industry began towards the end of last century when he became associated with the late Mr. J. B. Braithwaite, at one time chairman of the City of London Electric Lighting Co. and the County of London Electric Supply Co. This association continued for fifty years.

The late Mr. H. A. Judge

In 1907 Mr. Judge took over the control of the Litholite Company, one of the pioneers of the plastics industry, which at that time was making mouldings of the thermoplastic natural resin type used exclusively for electrical purposes. Later the company's activities were extended into the field of synthetic resins, but it has continued to cater primarily for the electrical industry.

Mr. Judge was very active in public affairs ; he was a J.P. and councillor of East Barnet and many of his colleagues attended his funeral on March 10th.

Mr. C. H. Naylor.—We regret to record the death, on March 15th, at the age of seventy-two, of Mr. Charles Henry Naylor, who had been with the British Thomson-Houston Co., Ltd., for thirty-six years and latterly had been closely associated with the work of B.E.A.M.A. He was educated at Bradford Grammar School and Bradford Technical College, gaining the bronze medallion in the City and Guilds technological examination in 1895. After holding positions with firms in Leeds and with Willans & Robinson, Ltd., Rugby, he eventually became works manager with Johnson & Phillips, Ltd., holding this position until he joined the B.T.H. in 1907. He made numerous technical contributions to the development of the steam turbine and handled many large power station contracts (including Longford and Ironbridge).

Mr. Naylor leaves a widow, two sons and three daughters. His elder son, Mr. F. S. Naylor, is electrical engineer and manager to the Borough of Southwark, and his younger son is chaplain of Liverpool College.

At a service held at Rugby Parish Church on March 18th, there were present about 300 of the late Mr. Naylor's old colleagues, including representatives from the B.T.H. Co., Rugby, Metropolitan-Vickers, Hick Hargreaves & Co., and B.E.A.M.A.

Mr. R. Dean.—A memorial service to the late Mr. Rennie Dean, chief engineer and general manager of the Luton Corporation electricity undertaking, was held at Luton Parish Church on March 18th. The large gathering included members and officials of the Town Council and representatives of the electricity staff and employees, Mr. P. G. Campling (borough electrical engineer, Bedford) ; Mr. A. T. Bullen (manager, Welwyn Garden City Electricity Co., Ltd.) ; Mr. W. F. MacDonald (Ferguson, Pailin, Ltd.) and Messrs. A. L. Ashton and V. H. Long (Pirelli-General Cable Works, Ltd.). The funeral took place the same day at Bingley (Yorks).

Mr. W. A. Ireland.—We regret to record the death of Mr. W. A. Ireland, power station superintendent with St. Helens Corporation Electricity Department, which occurred on March 12th, at the age of forty-nine. Mr. Ireland joined the St. Helens undertaking in 1925 as assistant power station superintendent, and became power station superintendent in 1929. He had previously held appointments at Heywood, Rawtenstall and Manchester.

Mr. A. Wilson.—The death occurred in Edinburgh on March 10th of Mr. Andrew Wilson, who was for some time assistant superintendent of the Telegraphs Department of the G.P.O. in Edinburgh. He retired about 20 years ago.

Electrolytic Etching

TOOLS may be quickly marked and trade marks cheaply etched on the surface of almost all metals by means of a simple process developed by the Deloro Smelting & Refining Co., Ltd., Highlands Road, Shirley, Birmingham.

A number of small articles may be treated together and a whole sentence can be etched as rapidly as one word, while there is hardly any limit to the complexity of the design that may be transferred. The process is electrolytic and employs a standard waxed-paper stencil, such as is used in duplicating machines, on which the required words and designs are printed, typed, hand drawn, or otherwise produced.

On a graphite baseplate (negative pole) rests a pad (a few sheets of ordinary blotting paper) damped with the etching fluid, on which the stencil is placed face downward. The metal object to be marked is placed upon the stencil, also face downward, and covered with another graphite block (positive pole) that is weighted to maintain sufficient mechanical pressure for ensuring good electrical contact, particularly when several specimens are treated together. The latter should be reasonably flat, but need not be polished or free from grease. The circuit requires DC at 15 V, which is obtainable from any AC 200/250 V source through a transformer and rectifier equipped with an output controller.

The etching period varies from five seconds for a small design to ten seconds for a larger one, or say 30 seconds when 20 objects are etched at once; the current ranges from 2 to 10 A. The engraving is normally about 0·0005 inch deep and it has a silvery appearance. The apparatus is obtainable from Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Recommissioning Plant

THE reason Mr. Crook's letter received a chilly reception was apparently that he advocated action by a Government Department. In my experience there has been no difficulty in getting industrial concerns to offer their surplus electrical plant; rather has there been a tendency for them to dig out even the most antiquated equipment in the hope that it will be of considerable value.

The real difficulty is the supply of skilled labour for reconditioning and conversion, although the firm with which I am associated has had considerable success in training women armature winders. I am aware that female labour has been used on a considerable scale by motor manufacturers but mostly for work of a repetitive nature. I have found that by careful selection of the trainee, young women can be trained in twelve months to a degree of competence such as is normally attained in three years by a youth who starts in a winding shop at school-leaving age.

In your issue of March 19th, Mr. G. H. Holding referred to "half-a-dozen firms," but I think he will find the number is nearer half a hundred, with about ten times that number of smaller concerns who can undertake a smaller amount of work. If greater supplies of second hand electrical plant are needed, I consider that the best results could be obtained by publicity undertaken jointly by the firms concerned.

I would add that I have been engaged in the electric motor business for thirty years throughout the whole range, from armature winder's beer carrier to managing director of the class of firm to which this correspondence refers.

*Finchley, N.*3. W. E. LAWTON.

REFERRING to Mr. Crook's letters in your issue of February 5th and March 12th, also your footnote to his first letter concerning the National Stock List: Does he wonder why there was no reaction to his remarks, after perusing this Government publication?

The list comprises 183 pages covering 6,440 sq. in. of paper; 166 pages give a few lines of ferrous and non-ferrous metals, 4½ pages are devoted to 58 items of electrical plant, *viz.*: 10 Diesel or petrol engines, 8 generator sets, 5 generators and 35 AC and DC motors. The compilation of this remarkable list requires the services of eight regional offices, no doubt adequately staffed, with the prospects of further offices to be established in other parts of this country—truly a wonderful organisation.

Why do not the compilers of this list approach the many reputable firms, who are specialists in reconditioned plant throughout the country, and obtain their stock lists or registers of available plant? I have seen many of these firms' registers and stock lists set out for easy reference for one's requirements. Why do they not take advantage of the knowledge of these experts who have had years of experience in reconditioning plant?

The main point in your correspondent's letters does not appear to be fully appreciated. It is the question of the vast amount of privately owned plant lying idle, whose owners are either apathetic or ignorant as to its disposal. Here, then, is a chance for the compilers of the National Stock List to sponsor a national appeal to unearth this redundant plant, with the advice and active co-operation of some of these outstanding experts, thereby putting the scheme on a sounder basis with considerable saving of time.

*London, W.C.*1. H. H. HYWOOD.

As Others See It

DIFFICULTIES encountered by the layman who rashly undertakes to explain the mysteries of electrical terms are illustrated by the following translation of an item in the *Bulletin d'Association Suisse* of January 13th, 1943. The original is part of a report (the authenticity of which is guaranteed by our contemporary) which was presented some time before the war to a French municipal council by the mayor, but may be not altogether irrelevant to conditions nearer home.

"Let me go further and try to initiate you a little in electricity by the following illustrations: To supply, for example, 50 HP at a distance of 12 km. or even 20 km., an alternator of 75 periods 5,000 volts is required. The same alternator could equally well furnish 70 to 80 HP. There are 'Gramme' alternators which supply 65 periods. There are 'Jacquet' alternators which supply 75 periods. There are 'St. Ouen' alternators which supply 80 to 85 periods. A period is a phase in the construction or winding of the said alternator.

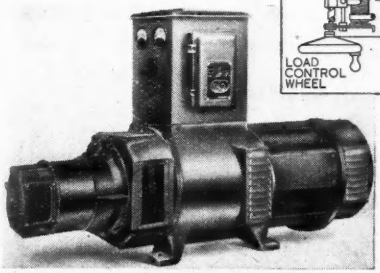
"The alternator is installed in the power station, and produces high-tension current at 3,000 or 5,000 volts or more, according to the demand, up to 30,000 volts. This alternator which supplies the current sends it into transformers on the boundary of the places supplied and gives a voltage of 110 to 250 volts, furnishing what is called low tension or otherwise 'three-phase current.' . . . In principle three-phase current requires 3 amperes per HP. There is practically no loss of current in the alternator."

Combustion Control

A Unified System

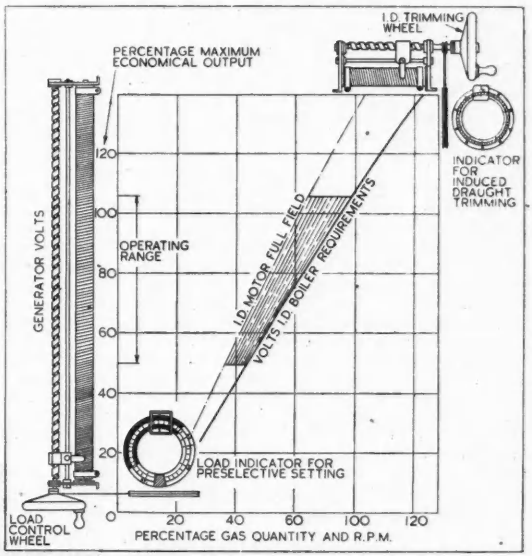
THE chief operating services for combustion are those for fuel, primary and secondary air, flue-gas exhausting and ash discharge. The unified boiler control system of the Metropolitan-Vickers Electrical Co., Ltd., which has now been adapted in single-unit form to smaller boilers (10,000 to 20,000 lb. per hr.) than hitherto, is based on a common positive control of the rate of flow of these services. These rates of flow follow the same law of variation with load change, but in practice they may need to be adjusted in relation to one another to meet alterations in operating conditions, *e.g.*, due to sooting of gas passages or change in fuel characteristics.

Special windings on the motors driving the boiler-house auxiliaries concerned enable each service to run at the correct speed to meet the boiler requirements, as given by the manufacturers, over the whole range of loading. These motors are supplied from a DC generator which is mounted in one housing with the squirrel-cage driving motor and the exciter. On top of the housing is the control cubicle. The field of the generator is energised principally at constant voltage from the exciter, but subsidiary shunt and series windings from the variable-voltage circuits boost or buck the main-field voltage to give the RPM curve requisite for the designed boiler requirements with the aid of a single field rheostat.



Self-contained motor-generator set for central control of boiler auxiliaries

For establishing the common line of control (armature-volts line) the largest motor, that driving the induced-draught fan, is taken. Independent speed adjustments can be made by trimming up to 20 per cent. of reduced speed from the full motor RPM, through the use of a pre-set rheostat connected in the fixed voltage supply to the field coils.



Performance curves of induced-draught fan

Forced-draught fans are claimed to be kept within 2 per cent. of boiler requirements with trimming up to 30 per cent. of full motor speed. A close approach to boiler requirements is also given by the common control (0·5 per cent.) of the secondary-air fans and the stokers, the first having a 30 per cent. trimming and the second a 50 per cent. trimming in order to meet changes in fire thickness.

The AC input to the motor-generator is from 23 to 61 per cent. of full rating over the usual operating range, a large proportion of the economy being due to the control of the fans, the power input for which increases with the speed regulation in accordance with a cube law.

Education for Industry

Perfecting Human "Raw Material."

IN a lecture to the Association of Supervising Electrical Engineers on March 16th, Dr. P. Dunsheath discussed education in its relation to industry. This relationship would, he believed, be a principal influence in shaping the new Education Bill which might be expected shortly. One way of looking at education, he suggested, was as a means of redressing the balance of export trade by building up new assets to compensate for the loss of income from foreign investments of some £200 million per annum. Human beings could be regarded from this standpoint in the light of raw material which could be turned by a logical system of education into the most valuable of finished products. In most trades quite 95 per cent. of the value of finished products was represented by human effort.

Recruitment for industry had been haphazard in comparison with that for the professions, although it offered better opportunities. Of the 500,000 young people leaving elementary schools, 60,000 leaving secondary schools and 10,000 leaving universities and technical colleges each year, less than 10 per cent. were touched by evening classes.

After-school education was of the utmost importance and for that reason Dr. Dunsheath questioned the advisability of raising the school leaving age to sixteen. Most boys desired to be engaged in active work before then, but this might indicate that the nature of education should be improved. In any case, abrupt transition from "all school" to "no school" was most undesirable and there should be a (possibly compulsory) "fusion" period in which the boy would be allowed at least one full day—not two half days—each week to attend a school (an institution was preferable to a works school) where his studies would be given a vocational "slant." He should also be required to attend evening classes once a week, in order to study some subject that was unconnected with his work, thus broadening his outlook. After-school education should include physical training and, in the widest sense, English.

As a high standard of living would depend largely on the adoption of mass-production methods, the needs of repetition workers had to be considered. They should be given opportunities of acquiring other interests to occupy their minds, but the best way to do this had not yet been discovered. Schoolmasters should be required to know something of the work their pupils would later be engaged in, which at the present time they rarely did.

In an industrial area, a headmaster should visit local works, say, once in three weeks. For boys who went on to universities, a break of two years after leaving school was advocated, the intervening period to be spent in industry.

Engineering Economics

Definitions and Proposals

WITH the object of imparting further impetus to the teaching of engineering economics to every engineering student in the universities and schools, Sir Frank Gill (International Standard Electric Corporation) has prepared a paper for submission to a joint meeting in London of the Institutions of Electrical, Civil and Mechanical Engineers.

The author's endeavour is to emphasise the importance of the subject and to indicate how readily a knowledge of it can be taught, illustrative examples helping to explain in an orderly manner how estimates may be made and summaries presented for final judgment.

It is submitted that the time has come to end the neglect of economics in the education of engineers. It is insisted that a knowledge of the subject and its relation to trusteeship is vital to all men who seek to enter the ranks of professional engineers.

Education in this basic matter can be given to all students without damaging the curriculum. The engineering institutions are urged to take cognisance of the subject in their own examinations and to consider withdrawing the exemptions from their examinations now granted to the holders of diplomas of certain universities and colleges which do not teach the subject.

The paper is additionally intended to give to teachers in schools some idea of what practising engineers mean by the term "engineering economics." The logical study of the subject is not difficult; the author divides it into eleven sections respectively concerned with requirements, alternative designs, first cost, life of plant, residual values, interest, annual charges, depreciation, estimates, interpretation and judgment (recommendation) with numerous worked-out examples to illustrate in an orderly manner how assessments should be made and

summaries should be presented for final decision.

The subject can be taught readily, the primary necessity being that students should be helped to realise the need for this kind of knowledge as well as for ability to use it. Graphical correlation between various alternatives and relative costs illustrates the outlook which engineers should have in relation to technology and finance. They are always searching for the lowest part of the summation curve, because they should constantly endeavour to find the method by which their aims can be achieved (by various technical means) in the manner most advantageous financially, bearing in mind the general warning principle that it is not economical to push the quest for technical efficiency too far, lest the cost of so doing become too burdensome.

The false idea that only the older engineers of experience need this knowledge must be dispelled. The need for economics arises immediately a young engineer is given the task of designing a piece of apparatus. What is meant by engineering economics is the trusteeship in which professional engineers find themselves by reason of their relationship to finance, particularly to the finance of those who employ them.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, April 1st, 5 p.m. Films on Sir Ambrose Fleming and Dr. A. E. Kennelly. 5.30 p.m. Paper: "The Effect of the National Grid on the Operation and Maintenance of Secondary Power Stations," by Mr. R. A. W. Connor.

Wireless Section.—Wednesday, April 7th, 5.30 p.m. Lecture on "Radio Exploration of the Ionosphere," by Sir Edward Appleton.

Installations Section.—Thursday, April 8th, 5.30 p.m. Paper: "The Protection of Structures against Lightning," by Mr. J. F. Shipley.

North Midland Students' Section.—Saturday, March 27th, 2.30 p.m. Griffin Hotel, Leeds. Paper on "The Development of Economic Thought," by Mr. W. E. Allen. (Joint meeting with Graduate Sections of the Institutions of Mechanical and Production Engineers.)

South Midland Centre.—Thursday, April 1st, 6 p.m. Grosvenor Room, Grand Hotel, Birmingham. Paper: "Telecommunications of the Future," by Dr. W. G. Radley. (Joint meeting with Post Office Electrical Engineers.)

London Students' Section.—Monday, April 5th, 7 p.m. Paper: "Modern British Tramways," by Mr. B. J. Prigmore.

North-Western Centre.—Monday, April 5th, 6 p.m. Corporation Electricity Showrooms, Chester. Paper: "A High Voltage, High Rupturing Capacity Cartridge Fuse and its Effect on Protection Technique," by Mr. K. Dannenberg and Prof. W. J. John. (Joint meeting with Mersey and North Wales (Liverpool) Centre and Chester Engineering Society.)

North-Western Wireless Group.—Friday, April 9th, 6 p.m. Engineers' Club, Manchester. Informal discussion on "Frequency Modulation" to be opened by Mr. D. A. Bell.

North-Western Students' Section.—Saturday, April 10th. Engineers' Club, Manchester. Annual general meeting. Owing to indisposition, Mr. J. A. Barnett will not be able to present his paper on "Remote Control of Switchgear" and instead it has been arranged to hold a "Brains Trust" meeting (questions to be sent in by April 3rd).

North-Eastern Students' Section. — Friday, April 9th, 6.30 p.m. (altered from April 2nd). Neville Hall, Newcastle-on-Tyne. Paper: "Insulating Varnishes," by Mr. W. P. Walters.

Royal Society of Arts.—Monday, March 29th, 1.45 p.m. Institution of Electrical Engineers, Victoria Embankment, W.C.2. Third Cantor Lecture on "The Modern Power Station"—"The Mechanical Equipment of the Turbine House," by Mr. F. Shakeshaft (C.E.B.).

Birmingham Electric Club.—Monday, March 29th, 5.20 p.m. Grand Hotel. Annual meeting. 6 p.m. Paper on "Plastics" by Mr. J. Jarman.

Society of Chemical Industry.—Chemical Engineering Group.—Wednesday, March 31st, 2.30 p.m. London School of Hygiene, W.C.1. Paper: "Design of Drying Machines for Agricultural Products," by Dr. W. H. Cashmore.

Institute of Welding.—Wednesday, March 31st, 6 p.m. Institution of Mechanical Engineers, Storey's Gate, S.W.1. Paper: "A Development in Welded Fabrication for Merchant Shipbuilding," by Messrs. R. B. Shepheard, R. Boardman and C. J. Jensen.

Nottingham Society of Engineers.—Monday, April 5th. Corporation Gas Showrooms, Parliament Street. Paper: "Electric Welding," by Dr. J. H. Paterson.

Institution of Chemical Engineers:—Friday, April 2nd, 11 a.m. Connaught Rooms, London, W.C.2. Twenty-first annual corporate meeting. Noon. President's address on "The Chemical Engineer in Reconstruction." 1 p.m. Luncheon.

Electrodepositors' Technical Society.—*London.*—Monday, April 5th, 5.30 p.m. Northampton Polytechnic, St. John Street, E.C.1. Discussion on "Devices for controlling the Distribution of Electro-Deposits," to be opened by Mr. C. J. Leadbeater. *Birmingham.*—Tuesday, April 6th, 6 p.m. James Watt Institute. Paper: "Applications of Heavy Nickel Deposition," by Mr. L. Wright.

Measurements Section Luncheon

AN informal luncheon is being held by the I.E.E. Measurements Section at the Connaught Rooms, London, W.C.2, on April 16th, at 12.30 for 1 p.m. (tickets 8s. 6d. each). The April Section meeting has been arranged to take place on the same day to give members from the provinces an opportunity to attend ; will start at 3 p.m., not at 5.30 p.m. as previously announced. The subject of the paper to be read by Mr. A. R. Dunton is "The Control, Specialised Testing and Use of Some Modern Insulating Materials."

NEW BOOKS

Short-Wave Technique. First Steps in Electricity.

Short Wave Wireless Communication. By A. W. Ladner, A.M.Inst.C.E. and C. R. Stoner, B.Sc. (Eng.), A.M.I.E.E. Fourth Edition. Pp. 573; figs. 342. Chapman & Hall, Ltd., 11, Henrietta Street, W.C.2. Price 35s.

First published in 1932, successive editions of this manual have been necessitated owing to the developments which are continuously taking place in the technique of this important branch of radio communication. The new edition might have disclosed greater advances in technique than it does, were it not for the fact that under present conditions they are of a secret nature.

As it is, the book follows the lines of previous editions, except for a change in chapter sequence bringing propagation, line theory and aerials close together in the book. Short and ultra-short waves are now dealt with together, whereas in previous editions ultra-short-wave working was more or less isolated in a chapter of its own.

The complete field of short-wave transmission and reception is covered in eighteen chapters, which also include information on commercial wireless telephone circuits and high-frequency therapeutic apparatus. As one goes down the wavelength scale, a point is reached when further improvements in the construction of conventional thermionic valves are of no ava l —the transit time of electrons becomes no longer negligible, and a different technique must be employed. This subject is dealt with in a chapter on electron oscillators, including the magnetron and the klystron.

It is to be hoped that by the time the fifth edition of this " standard work " on short waves is published it will be possible to include an account of the recent advances which will add considerably to the interest of the book.—W. E. M.

Essential Metallurgy for Engineers. The Causes and the Control of Metallic Properties. By A. C. Vivian. Pp. 155 ; figs. 33. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 8s. 6d.

For a proper appreciation of this work it must be borne in mind that the book never pretends to be a metallurgical textbook and that to criticise it from the wrong standpoint would be to do an injustice to the author. It is an ambitious task to attempt in so small a space to introduce effectively to engineers with but little metallurgical training the basic reasons for the behaviour of the metals with which they are familiar. To some extent it is a task which has been undertaken successfully.

The analysis of mechanical properties has been handled in a manner calculated to be easily assimilable by the reader for whom the book is written, and the fairly full treatment given to carbon steels is a practical and lucid abbreviation of a vast subject. Although the majority of engineers are concerned mainly with ferrous metals, the profession embraces many thousands of representatives of the electrical industries and it must be remarked that, apart from light alloys, non-ferrous metals and alloys are dealt with almost cursorily. The author seems to suggest that the approach to an understanding of most metallurgical phenomena is to know one's ferrous metals first and then to apply the acquired principles to the non-ferrous field. This may or may not be an effective method, but to many it will seem inconvenient.

For the purpose of setting out the basic principles of elastic and plastic deformation, Dr. Vivian makes excessive use of the term " amorphous metal " as applied to grain boundary structure. By such means many phenomena are (apparently) satisfactorily explained, but there lies in this course the danger that, through its repeated presentation, the engineer reader may come to regard what was, at best, a working hypothesis of twenty years ago as an established fact of to-day. A further criticism is that some metallurgical terms, which are in a few cases coined phrases, are suddenly introduced into the text without adequate prior or subsequent explanation.

The glossary of terms relative to the general subject must inevitably be inadequate within the space available for this section in a small volume but, on the whole, the list of metallurgical expressions which Dr. Vivian has included is a natural and useful addition to an engineer's guide-book to metallurgy.—L.B.H.

Teach Yourself Electricity. By C. W. Wilman. Pp. 184; figs. 114. English Universities Press, Ltd., St. Hugh's School, Bickley, Kent. Price 3s.

The attractive and interesting way in which this book has been written makes it very suitable for use by the home student taking his first steps towards an electrical career, the practical engineer who has had little opportunity to gain a proper theoretical foundation for his work, and also the reader who is interested in electricity for its own sake. Members of the Services, too, will find it useful both for their immediate needs in the technical branches and for preparing themselves for doing electrical work after the war.

The fundamentals of electricity and magnetism, chemical effects, magnets, generators and motors, inductance and capacitance, AC and DC, transformers, convertors and rectifiers, measuring instruments, communication, etc., are among the aspects of the subject touched upon. The amount of ground covered and the necessity for extreme simplification of the text inevitably leave the reader occasionally somewhat in the air and also lead the author to make assertions that are not strictly accurate or at any rate need qualification. The somewhat unorthodox method of approach should, however, encourage the desire for further study.—W. R. C.

Teach Yourself Household Electricity. By Caroline Haslett. Pp. 215; figs. 35. English Universities Press, Ltd. Price 3s.

The present-day need for fuel economy and for keeping one's domestic electrical apparatus in good order give the new edition of this useful and instructive little book an enhanced value. Many of the sections do not, of course, apply under existing circumstances, but study of them will be all to the good in preparation for the anticipated increased use of electricity in the home after the war.

COMMERCE and INDUSTRY

Mr. Churchill's Speech. *Higher Engineering Wages.*

The Premier and Electricity

IN the course of his broadcast speech last Sunday, the Prime Minister referred to the difficulties which would have to be faced after the war in placing our exports profitably in a world filled with ruined countries. Nevertheless, he was advised that after Hitler's defeat there would be considerable opportunities for re-establishing our exports.

The immense building programme which would have to be undertaken would give a great stimulus to a large number of trades, including the electrical and metal industries. We had learned much under the stress of war and our methods had vastly improved. Mass production had been forced upon us and the electrification of industry had been increased 50 per cent.

There were some significant new industries offering scope for the inventiveness and vigour which had made this country great. The constant improvements in wireless and the wonders of radiolocation applied to the arts of peace would employ the radio industry. Striking advances were open for both gas and electricity as servants of industry, agriculture and the cottage home.

Group Payment by Results

Particulars of a payment-by-results agreement made between the Shipbuilding Employers Federation and the Electrical Trades Union are given in the March *Electrical Trades Journal*. The system introduced is a group contract scheme, not an individual one. Contracts and prices are to be arranged between the managements of individual firms and representatives of the E.T.U. members which they employ. Contracts may be arranged either for particular parts or sections of a ship or for the whole of the electrical work of a ship (including shop work), in accordance with circumstances and in the best interests of production.

Apprentices, "dilutees" and any other electrical labour employed directly on the contract may be included in such schemes. Contracts and prices will be exclusive of extra payments for Sunday and overtime work, although the hours worked will be taken into account.

Better Vehicle Lighting

A great deal of attention has been paid to the recent concession which makes the illumination from cycle lamps more effective. But the same Order, the Lighting (Restrictions) (Amendment) Order, 1943 (S.R. & O. 1943 No. 316, Stationery Office, 1d.), also permits improved lighting in public vehicles by amending the original Lighting (Restrictions) Order, 1940.

Except in such areas as may be specified by the Minister of Home Security, the permitted maximum interior lighting of tramcars, trolley vehicles and public service vehicles is raised from 0·1 ft.-candle at seat level to 0·7 ft.-candle. The permitted maximum illumination produced at any point at ground level outside the vehicle is increased from 0·001 to 0·002 ft.-candle. During air-raid warning periods the lighting must be reduced to give not more than 0·0002 ft.-candle at any point at ground level outside the vehicle. For specified areas the limits remain the same and all bulbs must be screened so as not to be seen from outside the vehicle.

Better lighting of platforms is allowed. At platform level the maximum is 0·05 ft.-candle, falling to 0·035 ft.-candle within 5 ft. of the lowest step and to 0·001 ft.-candle at any point beyond this.

The provisions with regard to the lighting of trains are also amended and a similar Order has been made for Northern Ireland.

Private Chattels War Damage Premium

The Board of Trade announces that with the approval of the Treasury it has decided to reduce the scale of premiums payable under the Private Chattels Scheme to one-half of the existing rates. The new premiums will accordingly be:—10s. per cent. per annum on the first £2,000; 15s. per cent. on the next £1,000; 20s. per cent. on the next £7,000. They will apply to all policies under the Scheme issued for a period of insurance beginning on or after March 18th. The minimum premium payable will be 10s. and policies will continue to be issued for a period of one year. Effect has been given to this decision by the War Damage (Private Chattels Scheme) (No. 4) Order, 1943 (S.R. & O. 1943 No. 404, price 1d., Stationery Office).

E.D.A. Eastern Area

Mr. P. E. Rycroft, chief engineer and general manager of the Great Yarmouth Electricity Department, presided at a luncheon at Ipswich which followed the first annual meeting of the E.D.A. Eastern Area. He mentioned that Mr. G. A. Vowles, borough electrical engineer and transport manager at Ipswich, had been elected to the Council of the Association and said it was an honour which he richly deserved.

Mr. S. C. Grimwade, chairman of the Ipswich Electricity Committee, proposing the Association toast, expressed the hope that in planning for the future they would not be afraid to launch out in attempting things which they knew could be done.

Mr. V. W. Dale, in replying, remarked that it was the policy of the Association to improve the status of area organisations which would put more responsibility on area representatives.

Engineering Wages Award

The National Arbitration Tribunal has issued its award in the claim for increased wages by the trade unions in the engineering industry. The unions asked for an increase of 11s. in basis rates; an increase equivalent to 33⅓ per cent. of basis rates for all plain-time workers; and the restoration of the pre-1931 conditions governing overtime rates, etc. The Employers' Federation offered to increase the bonus to plain-time workers by 6s. a week and to consolidate 20s. of the bonus in basis rates. They also proposed a re-arrangement of piece rates

to give an increase to lower-paid workers but not to those already earning high wages.

The Tribunal's award provides for the consolidation of 20s. of the bonus in basis rates; an increase of 6s. in the plain-time workers' bonus, raising it to 21s. 6d. a week, the bonus for piece-rate workers to be 13s. 6d.; and an adjustment of conditions for piece workers so as to enable them to earn at least 27½ per cent. over the new basis rates, excluding the national bonus.

The award safeguards merit rates paid to individual workers but provides that the bonus shall be correspondingly reduced where commonly-applied rates are in excess of the district inclusive rates. The latter provision is not to apply to certain skilled workers, such as inspectors, maintenance men and setters-up, who are paid above the district rate by national or district agreements. The award applies as from March 20th.

"Music While You Work"

The Court of Appeal on March 17th confirmed the recent decision of Mr. Justice Bennett that music reproduced in factories constituted a "public performance" for which fees must be paid.

The matter arose out of two actions. The first was taken by Ernest Turner Electricat Instruments, Ltd., who asked for a declaration that the reproduction of musical works, the copyright of which was owned by the Performing Right Society, did not constitute an infringement of that copyright. Mr. Justice Bennett held that the performances were in public and refused to grant the declaration asked for. In the second action the Performing Right Society claimed a declaration that the defendants, Gillette Industries, Ltd., were not entitled to reproduce works of which the plaintiffs held the copyright without leave or licence. Mr. Justice Bennett decided in favour of the plaintiffs.

In the Court of Appeal Ernest Turner Electrical Instruments, Ltd., and Gillette Industries, Ltd., appealed against these decisions. In giving judgment against them the Master of the Rolls said that it was important to consider whether a particular performance was calculated to whittle down the monopoly granted by the Copyright Act to any considerable extent. Performances were now being given in factories to millions of workpeople. The workpeople in each factory were an audience and as such must be regarded as a fraction of the public and it followed that the diffusion of music in the factory was a performance in public.

The appeals were accordingly dismissed, Lord Justices Luxmoore and Goddard concurring, and leave to appeal to the House of Lords was refused.

Shellac Supplies

The Ministry of Supply states that a representative of the U.S. Board of Economic Warfare is being sent to India to co-operate with the representative of the Ministry of Supply in the operation of the Indian shellac procurement programme. The present system of public purchase of all shellac for importation into the United States and the United Kingdom will be continued and no change in the prices paid for shellac is contemplated. The Defense Supplies Corporation, acting under the direction of the Board of Economic Warfare, will continue to be the sole buyer of shellac for importation into the United States.

"Wings for Victory" Week

During "Wings for Victory" Week a sum of £12,806 was raised by the Telcon Works Savings Group (covering employees of the Telegraph Construction & Maintenance Co., Ltd., and Submarine Cables, Ltd.). At a dance held in the works hall, the expenses of which were borne by the T.C. & M. Co., fifty savings certificates were distributed as prizes. A competition for thirty certificates presented by the company and ten given by Sir Geoffrey R. Clarke, managing director, resulted in the purchase of a further 133 certificates. An award of five certificates made by Mr. L. J. Ransom, works manager, for a correct forecast of the total amount subscribed, was won by the yard wire gang.

Avoiding Heat Losses

A memorandum on Fuel Economy has been issued by the British Plastics Federation, Ltd., which is to be read in conjunction with bulletins of the Ministry of Fuel and Power. This includes a number of practical hints such as the following:—At 100 lb. per sq. in. a ½ in. hole will waste annually 2½ tons of coal and an unlagged 6-in. flange about 1 ton; every sq. ft. of unlagged steam surface at the same pressure causes an hourly loss of 820 BThU, equivalent to 1 lb. of steam.

Co-operation of Utilities and Industry

Mr. J. H. Lumsden, chief engineer of the Stalybridge, Hyde, Mossley and Dukinfield Electricity Board recently convened a conference of district industrial executives to promote collaboration between representatives of industry and the public utility services. The result is the formation of a discussion group to be named "The Tameside Executive Engineers' Group." Mr. F. Mather, A.M.I.E.E., substations engineer of the Stalybridge Board has accepted the office of secretary. Monthly meetings will be held. Membership is restricted to persons of executive status in engineering enterprises in the district.

Increasing the Life of Cutting Tools

The Machine Tool Control has issued Leaflet No. 9 (illustrated) which gives useful hints on how to increase the life and efficiency of cutting tools, including hobs, milling cutters, broaches, and tungsten carbide tools.

"Mechanical World" Year Book

A feature of the 1943 edition of the *Mechanical World* Year Book is a new section dealing with light metals and alloys. These play an important part in modern warfare, and the stimulus given to development by the pressure of wartime conditions has greatly widened the sphere in which they are of interest; special attention has been paid to the important wrought light alloys. The section on presswork has been enlarged in view of the importance of this subject. Another interesting chapter is that dealing with the selection and substitution of

processes, which also gives useful information on die-casting and plastics. The remainder of the volume has been revised, and recent data are included in the tables of speeds and feeds of certain types of cutting tools. The Year Book is published by Emmott & Co., Ltd., at the *Mechanical World* office, 78, Palatine Road, Manchester, and 28, Bedford Street, London, W.C.2, at 2s. 6d. net.

Catalogues Wanted

The British Electrical & Manufacturing Co., Ltd., Newcastle-on-Tyne, asks manufacturers to send catalogues to its Sunderland branch at the new address 16, Bridge Street.

Changes of Address

The address of the Southern District of the National Union of General and Municipal Workers has been changed to Halliford, 11, Langley Avenue, Surbiton, Surrey.

Barries Electrical Agencies has removed to King Street, Brighton, 1 (telephone: Brighton 4456).

TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections may be entered within a month from March 17th:—

TEWEL. No. 621763, Class 9. Electric batteries and terminals, metal boxes and lead plates for electric batteries, wire for electrical purposes, and fuses.—Whitesides (Clitheroe), Ltd., Empire Buildings, Parson Lane, Clitheroe.

ALPHAPAX. No. 621805, Class 9. Electric dry cells and dry batteries.—Alpha Accessories, Ltd., Lockfield Avenue, Brimsdown, Enfield.

HELIOS. No. B.621115, Class 11. Electric lamps for cinematographic purposes, and projection lamps for use in floodlighting.—Helios Electric Lamp & Glass Works, Ltd., 6, Angel House, Islington, London, N.1.

JABLIN. No. 621660, Class 17. Fibrous material impregnated with resinous substances and compressed to various densities for insulating purposes. — Moulded Components (Jablo), Ltd., Mill Lane, Waddon, Croydon.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

HITENSITE insulating material.

VITRIT heat resisting tubes.

Strange Cooker Fire

New Zealand House Blackened

THE extraordinary results of a fire in an electric cooker are described by Mr. W. A. Waters, M.I.E.E., electrical engineer to the Manawatu-Oroua Electric Power Board, in the *New Zealand Electrical Journal*.

A joint was put into the oven at 9 a.m. with the bottom element at "medium" and the other elements off. When the housewife returned at 9 p.m. the house was full of black smoke and it was subsequently found that the walls and ceilings of every one of the five rooms were almost dead black as though a spray gun had been used, while clothes, sheets and cushions had all been saturated with the products of combustion and soot. An inspector who first visited the house telephoned to Mr. Waters that the damage was "astounding." Power was off at the cooker, the oven door of which had been blown open, and all the switch handles at the top had been burnt off. The cooker was a standard model and had been installed about three years.

An examination which Mr. Waters conducted revealed that the contents of the oven had caught fire and owing to insufficient air the burning fat had produced a very large amount of lamp black which, with the more volatile oils, had settled everywhere. The coatings were particularly thick on the ceilings and when rubbed felt greasy.

Inspection of the oven confirmed that only the bottom element had been left on, at medium heat. This provided sufficient wattage to overcome radiation losses and pile up heat in the oven. There was absolutely no hole or leak in the meat dish such as might have allowed fat to drip on to the element and cause a fire. The lower element had burnt out and both the oven fuse and pole fuse had blown. All that was left of the joint was a few lumps of substance like coke.

Turbine Deposits

Effect of Temperature on Character

A CASE cited recently before the American Society of Mechanical Engineers, illustrates the effect of temperature on the character of solid deposits (carried over from the boiler) on turbine blading. It was stated that solids had been removed from a back-pressure turbine by opening the governor by-pass valve to increase the exhaust temperature from 450 to 600 deg. F. for fifteen minutes every eight hours, the deposits being re-dissolved in the higher-temperature steam. Within a turbine range of from 300 to 600 deg., it was also submitted, deposit occurs as grey sparkling crystals often found with sodium oxide in combination.

Scale up to 1/32 in. may be built up not only on the blades but also on the shrouding and parts away from the main steam flow. Below about 300 deg. glassy deposits may be found; these do not contain sodium oxide, but may include some iron oxide and traces of organic matter, presumably derived from oil, which cling to the convex surfaces of the turbine blades in the steam flow.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Live-line Detector

THERE are limitations to the use of a neon tube device for determining whether a circuit is alive, for it can neither gauge the magnitude of the voltage nor distinguish between an electrostatic charge and a direct connection, while its reliability can be seriously interfered with by neighbouring live conductors. Therefore the latest tester announced by EVERETT, EDGCUMBE & CO., LTD., Colindale Works, Hendon, London, N.W.9, has been made to comply with the recommendations of E.R.A. which has shown by investigation that to be really effective a live-line detector must embody a direct-reading voltage indicator connected through a high series resistor.

The new model consists of a rectifier-operated moving-coil indicator graduated directly in volts with a hand grip on one side and a long tubular extension containing a high-voltage resistance having a spike at the upper end. The resistance is continuous throughout, not interrupted by the instrument circuit, which is merely connected in shunt to a portion of it, so constituting an important safety feature. An earthing lead terminating in a " bulldog " clip is provided, but its inadvertent detachment will not render the tester unsafe to use.

Multi-range live-line tester, shown dismantled

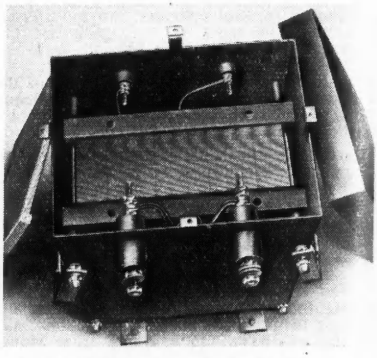
Besides serving as a live-line detector the instrument will measure the actual voltage to earth of any conductor to which it is applied and also distinguish between a DC charge and a direct connection. It is made in all ranges for from 7 to 70 kV and each instrument is provided with a range-changing key which increases the sensitivity about three times, for example giving a 25-kV instrument an additional range of 8 kV. Thus, not only is the usefulness of the tester directly increased, but it can also be checked with the aid of any portable hand-driven generator to ensure that it is in working order when a live circuit is not available for the purpose.

Small Air-cooled Transformers

A range of portable single-phase transformers of the air-cooled type has been introduced by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17, for general use in circuits up to 660 V and sizes from 0·3 to 5 kVA.

They have shell type windings with rectangular coils up to the 2-kVA size and circular coils for the remainder, contained in sheet metal housings with over-hanging cover, the deep lip of which renders them drip-proof. Drop handles are fitted to the larger sizes, the 2-kVA size weighing 75 lb. and the 5-kVA size 175 lb.

A feature that is unusual is the provision made to exclude vermin, which consists of perforated metal shields at the top and bottom of the transformer itself.



Portable 3-kVA, single-phase, 440/110-V transformer with vermin screen detached

This series complies throughout with the requirements of B.S.S. 171/1936, though that specification relates only to ratings of 1 kVA and upwards. If required, tappings connected to a five-position off-circuit tap changer on the high-voltage side can be provided. The housings are normally drilled for conduit connection, but arrangements can be made for glands for cable entry. Alternatively, it is possible to fit bushed holes or through-studs for external connection, but in this case special precautions must be taken on site to render them drip-proof. A mid-point connection to the low-voltage winding is an optional feature and if provided is brought out either with the l.v. leads or earthed direct to the housing by means of copper strip. Access to the terminal board and to the tap changer, if fitted, is obtained readily by lifting the cover which has been designed to facilitate that operation.

Abnormal Conditions in Switzerland

IN Switzerland, where nearly all electricity is generated by hydro-electric means (99·5 per cent. in 1938) the abnormally low level of the rivers has necessitated further restrictions. Space heating by electricity is forbidden at peak hours except in districts more than 2,600 ft. above sea level where the limitation applies only between 10 a.m. and noon. Electricity can only be used at week-ends for heating bath water. A 50 per cent. cut in shop lighting has been decreed.

PARLIAMENTARY NEWS

By Our Special Reporter

Severn Barrage Scheme

IN the House of Lords last week Lord Brabazon urged the Government to consider a scheme for the generation of electricity from the tidal power of the River Severn. He referred to the Committee, of which he was chairman, which studied the subject from 1925 to 1933, and said that although he thought the scheme proposed would have been received with acclamation it had been ignored. The potential output was 2,200 million kWh a year at an average cost of 0·18d. per kWh. Since the Committee reported, the cost of coal had risen from between 11s. and 18s. a ton to between 30s. and 40s. The scheme was originally estimated to require fifteen years to carry out; it could now be completed in eleven and capital costs would be lower.

Viscount Bledisloe, who supported Lord Brabazon, said that even if vast millions had to be expended on the scheme, in the long run it would undoubtedly be in the national interest. Vested interests had prevented the execution of the scheme in the past.

Lord Sempill, who also supported Lord Brabazon, said that the Government should ask Sir Alexander Gibb to go into the matter again, taking into account technical developments in the generation and distribution of electricity, and produce a fresh scheme along the lines of modern requirements.

Lord Templemore, replying for the Government, said there had been various important changes in the bases on which the Committee's recommendations were founded. First, there had been the rise in the price of coal, which in 1938 was 33 per cent. and in 1942 had risen to 112 per cent. above the price of 1932. Secondly, the approximate cost of coal per kWh of electricity, which was ·15d. in 1932, rose to ·16d. in 1938 and jumped to ·26d. in 1942. His advisers were not able to say at what level coal prices might be stabilised after the war, but it did not seem likely that there would be a return to pre-war standards.

Another important point to be borne in mind was that there had been great changes in electrical equipment and engineering constructional work. It was quite impossible to say at present what advance in price would be necessary to cover the civil engineering work under post-war conditions. On the one hand, of course, there had been great improvements in the methods of construction and simplification in the design of electrical plant, and, on the other, large rises in the costs of wages and raw materials.

Another important factor was the possibility of absorbing the maximum output from the barrage at the time of spring tides, which was nearly 800,000 kW. To absorb the full amount of this output under all conditions would involve closing down most of the existing stations in the southern part of England at some period. If the barrage scheme were to be supplemented by a storage scheme this would cost an additional capital outlay of £11,500,000.

A further change was the reduction in the interest rate. That operated in favour of the scheme, for it was probable that the necessary capital could be borrowed at a lower rate. The Government could not be expected to do more than give an undertaking that the recommendations of the Committee would receive most careful consideration in connection with post-war reconstruction schemes as a whole. They did not favour the setting up of a new Committee, but he would convey Lord Sempill's suggestion about Sir Alexander Gibb to the Minister of Transport.

Lord Brabazon intimated that he would be satisfied so long as the Government, though the report might be pigeon-holed at the moment, did regard it as a scheme which might be gone on with at some time.

The motion was accordingly withdrawn.

London J.E.A. Proposals

On March 16th in the House of Commons Capt. Shaw asked the Minister of Fuel and Power when and in what manner the recent proposals of the London and Home Counties Joint Electricity Authority had been communicated to the Electricity Commissioners or any member thereof; and what was their attitude towards the proposals.

Major Lloyd George said that the London and Home Counties J.E.A. sent him on February 15th a memorandum of proposals, stating that a copy had been sent to the Electricity Commissioners. He appreciated the work that had been put into this memorandum and he was consulting the Electricity Commissioners about its proposals.

Highland Water-Power Scheme

Mr. Henderson Stewart asked the Secretary of State for Scotland if he would indicate the adaptations, modifications and exceptions which he proposed to make to the Electricity (Supply) Acts, 1882 to 1936, referred to in Clauses 16 (1) and 21 of the Hydro-Electric Development (Scotland) Bill, in time to allow of consideration before the Bill was examined in Committee.

Mr. Johnston said that as the Lord Advocate promised during the second reading debate, it was the Government's intention to table in good time amendments to the Bill setting out adaptations and modifications in the provisions of the Acts of 1926 and 1935 relating to the Central Electricity Board in their application to the North of Scotland District. No undertaking was given to schedule the adaptation of the Electricity (Supply) Acts as a whole, but he hoped that it might be possible to deal with this matter also by way of amendments to the Bill.

British Wood Poles

In the article bearing the above title in our issue of March 19th, a close-up view is given (p. 378) of a fracture of a Scots pine pole and of a larch pole. The left-hand photograph is of the pine, that above the caption illustrating the larch.

ELECTRICITY SUPPLY

Dumfries Plant Disposal.

Clitheroe.—RATE CONTRIBUTION.—The Electricity department is contributing £1,000 to the relief of rates this year.

Dumfries.—DISPOSAL OF PLANT.—At the last meeting of the Electricity Committee the engineer reported that the Leafield Road generating plant was now redundant. He had communicated with the Electricity Commissioners who indicated that they would raise no objection to the Council disposing of the plant, provided that the amount obtained by its sale was used in satisfaction of any outstanding loan on the plant. The Committee recommended that the plant should be sold and this was approved by the Council.

London. — INCREASE IN CHARGES. — The Minister of Fuel and Power has authorised increases in the charges of the Central London Electricity, Ltd., as from the meter readings for the first quarter of the year. Under the St. Martin's, Strand, Holborn and City of London Orders the lighting flat rate will be 6d. per kWh and the " unit " charge of the two-part tariff 1d. Under the House-to-House, Chelsea, Kensington and Knightsbridge, St. James' and Westminster Orders the only change is in the two-part tariff " unit " charge which will be 1d. At present the two-part tariff running charge under all these Orders is ¾d.

Pontypridd.—WATER FOR ELECTRICITY UNDERTAKING.—The Minister of Fuel and Power has made an Order authorising the Council to utilise water from the River Taff for the purposes of the electricity undertaking.

Scotland. — HYDRO-ELECTRIC BILL. — At a meeting of Inverness Harbour Trust on March 18th the trustees agreed to support the Dock and Harbour Authorities' Association, who are petitioning that a clause be inserted in the Hydro-Electric Development Bill for exemption from the compulsory acquisition clause of land belonging to railways, harbours, docks, and other navigation authorities.

Overseas

Spain.—NEW DAM.—According to a message from Santander to the German news agency the S.A. Hidroelectrica del Cantabrico has been granted permission by the Spanish Ministry of Public Works to construct a 2·25 million cubic metre dam near Somiedo.—*Reuter's Trade Service.*

Sweden.—KRÅNGEDE EXTENSIONS.—Installation of the fourth generating set at the Krångede power station has recently been completed, but an old outlet tunnel is temporarily being used until the new tunnel is finished in May. The power-house is designed for six 35,000-kW sets, and the fifth is scheduled to be ready in March next year ; most of the preparatory work for it has already been completed.

PROGRESS AT TORPSHAMMAR.—It is reported that work on the first stage of construction of the Torpshammar station, on the Gimän river, will be completed about May or June this year. This comprises a 45,000-kW turbo-generator, and a second similar unit is projected. The power station has one of the longest water tunnels of any in the country (4,800 metres) which has been blasted through the mountain 100 metres below the surface, and the station itself is situated 140 metres underground.—*Reuter's Trade Service.*

Central London Charges.

RADIO & TELEPHONY

China.—RADIO LINK WITH UNITED STATES.—A *Reuter* message from Chungking states that a radio-telephone service between Chungking and San Francisco is being inaugurated, establishing the first direct inter-Continental communications link across the Pacific. The new service, which has been undergoing tests for over a month, will be open to use by the public, though the Government will hold a priority right.

Portugal.—SERVICE TO ARGENTINA.—A radio-telegraph service between Portugal and Argentina has been inaugurated with an exchange of telegrams between Dr. Salazar, the Portuguese Prime Minister, and M. Guinazu, the Argentine Foreign Minister.—*Reuter* (Lisbon).

Sweden. — TELEPHONE DEVELOPMENT. — The *Anglo-Swedish Review* reports that there were over one million telephone installations in Sweden at the end of 1942, an increase of more than 50,000 instruments during the year. The number of radio licences also increased by 80,000 to 1,630,000. These figures indicate that there is one telephone to every sixth inhabitant, and that every fourth Swede, or practically every family, has a radio set.

BROADCASTING SERVICES.—According to the Stockholm Press, there are now 33 broadcasting stations in Sweden 19 of which are owned by the State, and 14 are amateur transmitters which, however, under the present conditions only transmit the programmes of the State Broadcasting Service. Together these stations have an aggregate aerial rating of about 475 kW and when all are in full operation the annual consumption of electric power is at the rate of 8·5 million kWh. In addition, it is estimated that radio receivers consume approximately 70 million kWh annually, taking the average receiver as 50 W and the average time spent in listening-in as 2½ hours a day, the number of sets in the country being 1,600,000.

TRANSPORT

Darlington.—TROLLEY-BUS DEVELOPMENT.—The transport manager (Mr. W. H. Penman) has prepared plans for the post-war development of the trolley-bus system. The scheme is being submitted to the Ministry of War Transport for approval.

Manchester. — TRANSPORT ESTIMATES. — Estimates of the Transport Committee for 1943-44 provide for an income of £409,700 from trolley-buses and an expenditure of £368,300. Power expenses are calculated at £29,900 and repairs and maintenance at £37,000.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

British Thomson-Houston Co., Ltd.—In the course of his speech at the annual meeting on Friday last week, the chairman (Mr. W. C. Lusk), after reviewing the results for the past year (*Electrical Review*, March 19th), turned to possible post-war conditions. He said that no one desired maximum production and maximum employment more than the manufacturer but this could not be realised unless industry could dispose of its products. To think that maximum production would automatically be followed by corresponding consumption was an illusion from which holders of that view would have an unpleasant awakening when the time came to test such wishful thinking in practice.

Few, if any, products of the engineering industry could be sold successfully abroad which were not based on a good home market. To ensure this some safeguarding of the home market might be necessary. The extent to which British manufacturers could dispose of their products abroad would also depend somewhat upon the nature of any agreements with respect to international trade which might be made with other exporting countries and upon the extent to which former importing countries might be producing themselves goods which they formerly imported.

British Insulated Cables, Ltd.—In a statement to be presented at the Annual Meeting on April 1st, circulated with the report for 1942, Sir Alexander Roger, chairman, recalls the fact that during the year the offices of joint managing directors were allowed to lapse, Mr. T. H. Martin-Harvey was appointed deputy chairman, and Messrs. D. W. Aldridge, F. Waine and W. H. McFadzean were appointed executive managers. This action was taken, he explains, in order to distribute the burden of management more evenly to enable them to grapple successfully not only with wartime difficulties but with the many post-war problems that will inevitably arise.

After referring to the accounts (summarised in our last issue) the chairman points out that his brief survey gives a totally inadequate idea of the activities of the company during another year of war, activities which included taking over the management of several additional factories; one day the full story will be told.

Commenting on what he considers should be the main motives of a manufacturing concern, the chairman points out that the B.I. Pension Trust, Ltd., a separate entity from the B.I. Company, now has invested funds of almost £1,200,000 spread over some 359 different concerns. Also the building up of the provident fund will permit them to do even more for their retired workpeople and dependants. With regard to criticism of the "profit motive," Sir Alexander considers that this is often confused with profiteering. In the case of their own company, over fifty years ago a few adventurers pooled their very limited financial resources to embark on the manufacture of an entirely new design of cables, a risky business. On more than one occasion money had to be borrowed to pay the weekly wages, but the pioneering spirit of private enterprise persisted and ultimately a reasonable return was earned. Since then, substantial sums of money have been unselfishly ploughed back into the business to provide against bad times and to enable research and development work to be undertaken. Original shareholders, if there are any, have benefited from this profit motive policy, but he considers that to an infinitely greater degree benefit has accrued to the common good.

After the annual meeting it is proposed to hold an extraordinary meeting to consider a resolution to increase the capital from £3,000,000 to £4,000,000. The directors consider it to be in the company's interests to have further authorised capital available although it is not intended to make an immediate issue.

The British Power & Light Corporation, Ltd.—Presiding at the annual meeting held on March 18th, Sir Robert Hilton said that although the matter of the treatment of war damage in the case of public utility undertakings had been carried a stage further by the issue recently by the Government of a White Paper on the subject, the proposed Bill had not yet been presented in Parliament and the question had not been settled. In deciding on the dividend to be recommended, and the disposal of the company's available earnings, the directors had had regard to the war damage contribution which would be likely to fall on the operating companies.

In reviewing the accounts Sir Robert said that the gross revenue was now over £2,000,000 and was twice the figure for 1938. It was satisfactory to note that since then gross operating and management expenses had increased by only 15 per cent.

The Midland Counties Electric Supply Co., Ltd., held its annual meeting on March 17th, when Mr. W. Shearer (chairman) said that during the year they successfully met all demands made on their electricity supply and transport undertakings.

When he addressed shareholders a year ago, he mentioned that they had just put into operation certain revisions of tariffs for electricity supply. These represented a reduction in the year's revenue of over £40,000. They now had under consideration further revisions of the various tariffs and expected to be able to intimate these to consumers at an early date. They were pursuing their policy of price reductions with confidence, knowing that the business had been built on a strong foundation and that the sound commercial principles by which they had been guided during the past 30 years would enable them not only to face without undue anxiety any temporary depressions or setbacks that might be experienced, but on the conclusion of the war to continue a policy of intensive development leading to still further reductions in charges.

He made these remarks, however, with one reservation. If, as was suggested in certain

quarters, the supply industry was to be thrown into the melting pot of party politics, and as a result a bureaucratic control was to be exercised by and through new organisations, the power companies were to be wound up and supply undertakings were to be run by new bodies, *ad hoc* or otherwise, serious dislocation must inevitably ensue with results which he believed would be permanently detrimental to the interests of consumers and of the whole community. In making these observations he wished to make it clear that the industry was by no means unmindful of the desirability of further co-ordination and certain technical and other improvements which would tend to greater flexibility and still higher efficiency. He was sure that so far as private enterprise was concerned it would gladly co-operate at the appropriate time with the Minister of Fuel and Power in putting on the Statute Book such legislation as would ensure to a large extent such changes and improvements.

Dealing with the past year's working of the company's undertakings, Mr. Shearer said that there was little new domestic business during the year owing to the restrictions on connection. The consumption of this section increased at the normal rate in the early part of 1942, but their domestic consumers played their part in the fuel economy campaign and so far as could be ascertained their consumption during the present winter was substantially reduced. A good deal of new business was secured during 1942 from industries engaged in the war effort but which were likely to expand after the war. The power plants, transmission and distribution systems had given excellent service throughout the year. The transport properties again showed satisfactory trading results, the net revenue available to the parent company being only slightly less than last year's figure.

The Midland Electric Corporation for Power Distribution, Ltd., will hold its annual meeting on March 31st. In a statement circulated to shareholders, Sir Alexander Roger (chairman) says that the company continues to make satisfactory progress. Development has necessarily been restricted to urgent needs but they continue to cultivate goodwill and their engineering staff has been able to give advice and assistance in the economical planning and operation of electrical plant. They also initiated a conference with their friends in the gas, water and other utility services, and formed an association for mutual help in war emergencies.

In the post-war framework, as now being planned, there is a trend of opinion towards public control of electricity distribution, mostly from incompletely informed sources. Private enterprise has been the force behind the development of the electricity supply industry. The area of their company is in the sphere of influence of the West Midlands J.E.A. and has been developed and served as well as any in the country. When the scheme for joint authorities was included in the 1919 Act, their company, together with the Corporations of Wolverhampton, Walsall and West Bromwich, established the Authority for joint generation. They paid 40 per cent. of the initial costs and had made substantial contributions to its success. Their company holds the view that the organisation in this area is definitely to the advantage of consumers and should be continued.

Instead of talking of the superficial advantages of public control, he suggests that the basis of the M.E.C. Order should be offered to electricity undertakings of reasonable size, public and private alike. The Order includes a standard tariff for electricity supply and a standard profit on capital employed in the business. All profits above those permitted have to be returned to consumers in flat percentage reductions from the standard tariff, but the permitted profit is increased by ¼ per cent. in respect of each 2½ per cent. by which the electricity charges have been reduced below the standard tariff throughout the whole year. It is essentially a co-operative Order between the consumers and the company, its main principle being freedom of direction up to a permitted profit and thereafter a fixed division between service to the community and reward for development and efficiency.

The Lancashire Electric Light & Power Co., Ltd., reports receipts from subsidiary companies for 1942 of £225,629, as compared with £222,866 for the previous year, and from other sources, £3,218. After providing for directors' fees, establishment charges and debenture interest, the net revenue is £184,058 (against £181,904) to which is added £14,107 brought in, making £198,165 available. A participating dividend of ¼ per cent. is paid on the preference stock, making 7¼ per cent. for the year (same) and the final ordinary dividend is 5 per cent., again making 7½ per cent. for the year. The balance carried forward is £15,415.

Taylor Tunnicliff (Electrical Industries), Ltd., reports that after charging directors' fees, administration expenses and making provision for taxation, there is a balance for 1942 of £40,472 out of which the operating companies have paid dividends to the parent company amounting to £28,094. The balance of revenue is £28,050, to which is added £223 brought in, making £28,273. It is proposed to pay a final ordinary dividend of 12½ per cent., making 15 per cent. for the year (against 12½ per cent.), and to carry forward £724.

A. C. Cossor, Ltd.—It was announced last week that negotiations were proceeding between the company and another radio concern with a view to amalgamation. The other company was said to be the Philco Radio & Television Corporation of Great Britain, Ltd., and the matter was to come before a meeting of the Cossor board on March 24th. A. C. Cossor, Ltd., have a capital of £1,000,000 and that of Philco is £450,000.

Pye (Ireland), Ltd., reports a trading profit of £7,968 for 1942, as compared with £9,290 for 1941. Depreciation requires £509 and fees £355, leaving a net profit of £7,104 (against £7,322). The dividend for the year is maintained at 7½ per cent., and £4,033 is carried forward (against £2,973 brought in).

Ericsson Telephones, Ltd., reports a trading profit for 1942, after providing for depreciation, of £330,905, an increase of £22,024 as compared with the preceding year. Taxation requires £193,445, and after providing £25,000 for obsolescence and £1,500 directors' fees the net profit is £110,960, an increase of £7,109. As already announced, the final ordinary dividend is 12 per cent., plus a bonus of 3 per cent., maintaining the dividend for the year at 20 per

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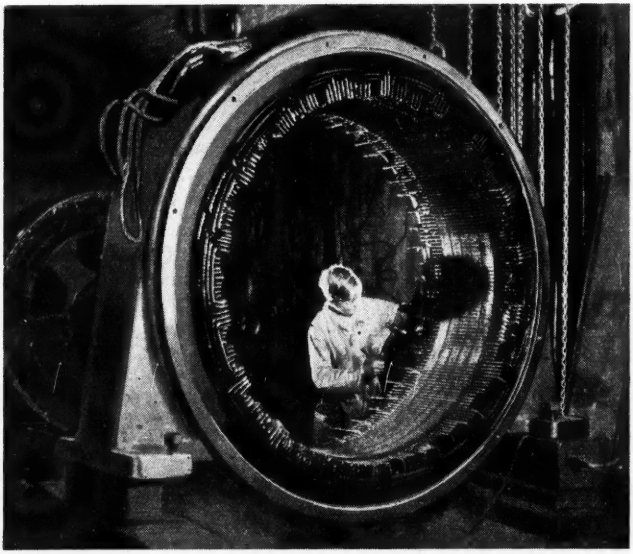

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cent. free of tax. A sum of £20,000 is put to reserve and £2,150 is placed to post-war contingencies fund. The balance carried forward is £31,068, a decrease of £195.

S. Guiterman & Co., Ltd., announce a net profit for 1942 of £38,101 (compared with £38,021 in the previous year), to which is added £11,820 brought in. A sum of £28,000 (£16,000) is provided as reserve for taxation, the ordinary dividend is raised from 7½ to 10 per cent. and an additional preference dividend of 3½ per cent. (against 1 per cent.) is paid. After placing £2,500 (£3,500) to general reserve and £2,000 (nil) to special war contingency reserve, £11,921 is carried forward.

Whitehall Electric Investments, Ltd., is paying 7½ per cent. less tax on the 7½ per cent. preference stock, being 3¾ per cent. arrears to September 30th, 1942, and 3¾ per cent. for the half year ending March 31st.

Brown Brothers, Ltd., are paying a final ordinary dividend of 10 per cent., making 12½ per cent., less tax, for the year ended January 16th (unchanged). The net profit for the year is £95,593 (against £96,245).

British Ropes, Ltd., report a net profit of £359,510 for 1942 (against £356,608). The ordinary dividend is maintained at 12½ per cent. by a final payment of 7½ per cent.

G. D. Peters & Co., Ltd., have declared a final dividend of 7½ per cent., again making 15 per cent. for the year. The net profit rose from £54,287 to £54,832.

The Watford Electric & Manufacturing Co., Ltd., is paying a second interim dividend of 10 per cent. (in lieu of final) making 15 per cent. for the year (unchanged).

The Nigerian Electricity Supply Corporation, Ltd., has declared an interim dividend of 3 per cent. less tax (against 4 per cent. less tax).

Enfield Rolling Mills, Ltd., is again paying a dividend of 2½ per cent. for the past year.

Heenan & Froude, Ltd., have announced an interim dividend of 5 per cent. (unchanged).

New Companies

Liberty Electrical Products, Ltd.—Private company. Registered March 9th. Capital, £300. Objects: To carry on the business of electrical and mechanical engineers and contractors, etc. Directors: W. F. Almond, 53, Kingsmead Avenue, Worcester Park, Surrey, and three others. Registered office: 207, Worton Road, Isleworth, Middlesex.

Marcus Fisher & Co., Ltd.—Private company. Registered March 9th. Capital, £1,000. Objects: To carry on the business of retail and wholesale merchants, manufacturers, factors and repairers of wireless apparatus and electrical instruments and accessories, etc. Directors: M. Fisher and E. Fisher, both of 3, Lytton Close, London, N.2. Registered office: 45, Chancery Lane, London, W.C.2.

Colourfast (Batteries & Engineering), Ltd.—Private company. Registered March 8th. Capital, £100. Objects: To carry on the business of manufacturers of, and wholesale or retail dealers in, electric batteries, lamps, fittings, plant and accessories. Subscribers: H. W. Fisher, C.A., Rylstone, Holders Hill Crescent, N.W.4, and M. E. Crichton, 59, Lyndhurst Gardens, N.3. Secretary: M. E. Crichton. Registered office: Rylstone, Holders Hill Crescent, N.W.4.

Companies' Returns

Statements of Capital

Kye Electrical, Ltd.—Capital, £25,000 in 20,000 preference shares of £1 and 100,000 ordinary shares of 1s. Return dated October 14th. 12,502 preference and 92,500 ordinary shares taken up. £17,127 paid. Mortgages and charges: Nil.

Cable Covers, Ltd.—Capital, £10,000 in £1 shares. Return dated November 23rd. 1,002 shares taken up. £1,002 paid. Mortgages and charges: Nil.

P.H. British Electrical Works, Ltd.—Capital, £5,000 in £1 shares. Return dated October 14th. 4,999 shares taken up. £4,999 paid. Mortgages and charges: Nil.

Derby Cables, Ltd.—Capital, £200,000 in £1 shares. Return dated October 14th. All shares taken up. £200,000 paid. Mortgages and charges: Nil.

Increase of Capital

Electrical Power Maintenance Service, Ltd.—The nominal capital has been increased by the addition of £1,000 in £1 ordinary shares beyond the registered capital of £1,000.

Mortgages and Charges

F. H. Hellyar, Ltd.—Assignment of contract moneys, dated March 1st, 1943, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Edward Wilcox & Co., Ltd.—Further charge on buildings at Sharston Road, Wythenshawe, Manchester, dated February 26th, 1943, to secure £1,500. Holders: Corporation of Manchester.

Receivers Released

Battery Supplies (Electrics), Ltd.—J. Ridehalgh, of 15, Canterbury Street, Blackburn, ceased to act as receiver and manager on February 1st, 1943.

Walton Electric Installations, Ltd.—J. W. Westle, 5, Carisbrooke Road, Liverpool, ceased to act as receiver and/or manager on February 22nd, 1943.

Bankruptcies

L. F. Kent, radio and electrical engineer, 32, High Street, Broadstairs. — Last day for receiving proofs for dividend, March 31st. Trustee, Mr. H. C. Treby, 7, Warwick Court, Gray's Inn, London, W.C.1.

D. G. Lee, electrician, 240b, Clapham Road, London, S.W.9.—First and final dividend of 10½d. in the £, payable any day (except Saturday) at Bankruptcy Buildings, Carey Street, London, W.C.2.

E. G. Williams, wireless and electrical dealer, 37, High Street, Brownhills, near Walsall.—Supplemental dividend of 1s. 2½d. in the £, payable April 19th at 37, Temple Street, Birmingham, 2.

STOCKS AND SHARES

TUESDAY EVENING.

THE lengthening of the days has brought a curtailment of activity in Stock Exchange markets. The aftermath of Wings for Victory week is evident in a kind of lassitude, approaching mild boredom, that characterises some of the popular departments in the Stock Exchange. Prices keep very firm. The Russian and the North African war news is read as satisfactory, but next month's Budget casts its shadows before, and people say they must know what they are "in for" before they care to enter into fresh commitments. The price-fluctuations in our lists are comparatively few and they possess, as a whole, no great significance.

The investor's appreciation of good dividend performance finds further witness in another rise of 3s., making 6s. within a fortnight, in Lancashire Dynamo shares. These now stand at 87s. 6d. ex the dividend which raised the year's distribution to 22½ per cent., comparing with the previous 20 per cent.

Electricity Supply

The market for Home electricity supply shares has settled down to a quieter condition than that which obtained just after publication of the plan of the London & Home Counties J.E.A. Possibly the first reaction to the proposals has been succeeded by a calm consideration which, rightly or wrongly, leads to the impression that dividends on the shares of the leading companies are in little danger of being reduced and that so far as reorganisation of the industry is concerned, this is not likely to become practical politics for several years. That the London companies are in a position to pay higher dividends than those which have been distributed of late is pretty generally agreed. It is assumed that dividends will not be increased, but that available profit will be ploughed back into the reserves of the various companies.

The Provincial Group

So far as the provincial electricity supply undertakings are concerned, the best ones are in so strong a financial position that interference with the dividend payments is considered to be extremely unlikely. On the other hand the proposals which have been formulated by the London & Home Counties J.E.A. may induce a feeling of uneasiness that will remain. While this may not bring in sellers of the shares, it will have the effect of checking the investment purchases which for many months past have taken place for the account of capital requiring a 4 per cent. return, with first-rate security. The arguments whether to sell or to hold are so nicely balanced that they can be resolved in individual cases only by reference to the surrounding circumstances.

Dividends and Prices

British Aluminium advanced to 49s. 9d. upon publication of figures that showed an increase of £2,537 in the net profit, which comes out at £419,800. The year's dividend is again made up to 10 per cent. and £251,900 is carried forward. At 19s. 6d. Vickers 10s. shares yield £5 2s. 7d. per cent. on the money. Walsall Conduits are 1s. up at 45s.; Telegraph Constructions are similarly better at 47s. 6d., and so, also, are Associated Electrical at 51s. Siemens moved up to 30s. 9d. and Hopkinsons to 57s. 9d.

The British Thomson-Houston figures gave general satisfaction. The ordinary shares are held mainly by Associated Electrical Industries. Ericsson Telephones are paying the usual 20 per cent. tax free for the year. The report is a very good one.

Miscellaneous Matters

Home Railway stocks are being neglected. The prior-charge issues hold their ground; Southern Railway 5 per cent. preference is 10s. up, at 117, but interest in the junior stocks has sunk to a low ebb and Southern 5 per cent. preferred is 10s. down at 73½. London Passenger Transports are unchanged. Thomas Tillings at 53s. 6d. are 6d. lower. Brazilian Tractions, with other dollar stocks, remain firm. International Telephone & Telegraphs are a point to the good at 9. Canadian Marconi's at 6s. 9d. have risen 3d. Cable & Wireless stocks maintain their recent advance; the ordinary is changing hands, in fairly large amounts at a time, around 76; the preference receives more notice, perhaps, from the investor of smaller sums, who prefers the 4¾ per cent. offered by the better security to the 5¼ per cent. yield on the ordinary stock. The front-rank industrial shares such as British Insulated, Callender's, General Electric, and Henley's hold tenaciously to a level that allows the buyer, at to-day's prices, rather less than 4 per cent. on the money.

Radio Companies

At a board meeting of A. C. Cossor, Ltd., the radio manufacturers, to be held on Wednesday in this week, there will be submitted proposals by one of the directors, Mr. T. A. Macauley, for amalgamation with another company. The chairman of A. C. Cossor, Sir Louis Sterling, on March 10th denied any knowledge of negotiations which were at that time reported to be going on between Cossor and some other company. A week later, on March 17th, Sir Louis Sterling stated that he had learned that one

(*Continued on page* 438)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Mar. 23	Rise or Fall	Yield £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	59/–xd	−1/6	4 4 7
British Power and Light	6	7	31/6	..	4 9 0
City of London	7	7	31/–	..	4 10 4
Clyde Valley	8	8	41/–xd	−6d.	3 18 2
County of London	8	8	40/–	..	4 0 0
Edmundson's:					
7% Pref.	7	7	34/–	..	4 2 4
Ord.	6	6	29/–	..	4 2 9
Elec. Dis. Yorkshire	9	9	45/–	..	4 0 0
Elec. Fin. and Securities	12½	12½	51/–	..	4 18 1
Elec. Supply Corporation	10	10	47/–	..	4 5 0
Isle of Thanet	2	Nil	16/–		—
Lancs. Light and Power	7½	7½	36/6xd	−6d.	4 2 2
Llanelly Elec.	5½	6	26/–	..	4 12 4
Lond. Assoc. Electric	4½	4	23/6	..	3 8 1
London Electric	6	6	26/6	..	4 10 7
London Power Red. Deb.	5	5	103½	..	4 16 7
Metropolitan E.S.	8	8	40/–	..	4 0 0
Midland Counties	8	8	40/–	−6d.	4 0 0
Mid. Elec. Power	9	9	44/–	..	4 1 9
Newcastle Elec.	7	7	31/–	..	4 10 5
North Eastern Elec. Ordinary	7	7	33/–xd	−6d.	4 2 4
7% Pref.	7	7	35/6xd	−6d.	3 19 0
Northampton	10	10	47/6	..	4 4 0
Notting Hill 6% Pref. (£10)	6	Nil	9¾	..	—
Northmet Power: Ordinary	7	7	37/–	..	3 15 8
6% Pref.	6	6	31/6	..	3 16 2
Richmond Elec.	6	6	26/–xd	..	4 12 4
Scottish Power	8	8	41/–	..	3 18 1
Southern Areas	5	5	23/6	..	4 5 0
South London	7	7	26/–	..	5 7 8
West Devon	5	5	23/–	..	4 7 0
West. Glos.	4½	3½	23/6	..	2 19 7
Yorkshire Elec.	8	8	41/–	..	3 18 1
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	5/–	..	—
Calcutta Elec.	7*	7*	34/6	..	—
Cawnpore Elec.	10	10	29/–	+1/–	6 18 0
East African Power	7	7	32/–	..	4 7 6
Jerusalem Elec.	7	5	24/6	..	4 1 8
Kalgoorlie (10/–)	7½	5	9/–	..	5 11 1
Madras Elec.	6*	4*	24/–	..	—
Montreal Power	1½	1½	27½	..	5 9 3
Palestine Elec. "A"	Nil	4*	37/6	..	2 2 7
Perak Hydro-elec.	6	7	9/–	−6d.	—
Shawinigan Power	82cts.	90cts.	18	..	—
Tokyo Elec. 6%	6	6	19	..	—
Victoria Falls Power	15	15	4	+1/6	3 15 0
Whitehall Inv. Pref.	5	5	23/–	..	—

Company	Dividend Previous	Dividend Last	Middle Price Mar. 23	Rise or Fall	Yield £ s. d.
Public Boards					
Central Electricity: 1955–60 (Civil Defence)	—	3	100	..	3 0 0
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	108	..	4 3 4
1963–93	3½	3½	104½	..	3 7 0
1974–94	3½	3½	102	..	3 3 9
London Elec. Trans. Ltd.	2½	2½	96½	..	2 11 10
London & Home Counties 1955–75	4½	4½	110	..	4 1 10
Lond. Pass. Trans.: A	4½	4½	121½	..	3 14 0
B	5	5	120½	..	4 3 0
C	2⅞	3	54½	..	5 10 3
West Midlands J.E.A. 1948–68	5	5	109	..	4 11 9
Telegraph and Telephone					
Angio-Am. Tel.: Pref.	6	6	114½	..	5 4 9
Def.	1½	1½	29	..	5 3 5
Anglo-Portuguese	8	8	24/–	..	6 13 4
Cable & Wireless: 5½ Pref.	5½	5½	114½	..	4 16 1
Ord.	4	4	76	..	5 5 3
Canadian Marconi $1	Nil	4cts.	6/9	+3d.	2 8 0
Globe Tel. & Tel.: Ord.	8½°	5°	35/–	..	2 17 2
Pref.	6	6	28/6	..	4 4 3
Great Northern Tel.: (£10)	Nil	Nil	23½	..	—
Inter. Tel. & Tel.	Nil	Nil	9	+1	—
Marconi-Marine	7½	7½	32/6	..	4 12 4
Oriental Tel. Ord.	16	10	37/–	..	—
Telephone Props.	6	Nil	14/–	..	—
Tele. Rentals (5/–)	10	10	10/9	..	4 13 0
Traction and Transport					
Anglo-Arg. Trans.: First Pref. (£5)	Nil	Nil	5/–	..	—
4% Inc.	Nil	Nil	13½	..	—
Brit. Elec. Traction: Def. Ord.	45	45	1105	..	4 1 6
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8	10	52/–	..	3 17 1
Brazil Traction	$1½	$1	23¾	..	—
Calcutta Trams	8	5½	21/6	..	5 2 4
Cape Elec. Trams	5	6	25/–	..	4 16 0
Lancs. Transport	10	10	43/3xd	+7d.	4 12 4
Mexican Light: 1st Bonds	5	5	100	..	5 0 0
Rio 5% Bonds	5	5	105½	..	4 14 9
Southern Rly.: 5% Prefd.	5	5	73½	−½	6 16 4
5% Pref.	5	5	117	+½	4 5 6
T. Tilling	10	10	53/3	−6d.	3 15 5
West Riding	10	10	41/6	..	4 16 7

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Mar. 23	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord.	7½	10	40/–	..	5 0 0
Assoc. Elec.:					
Ord.	10	10	51/–	+6d.	3 18 6
Pref.	8	8	40/–	..	4 0 0
AutomaticTel.&Tel.	12½	12½	57/–xd	+1/6	4 7 9
Babcock & Wilcox	11	11	50/6	..	4 7 2
British Aluminium	10	10	49/9	+6d.	4 0 4
British Insul. Ord.	20	20	5⅛xd	..	3 19 3
British Thermostat (5/–)	18½	18½	17/6	..	5 5 9
British Vac.Cleaner (5/–)	10	15	23/9	..	3 3 2
Brush Ord. (5/-)	Nil	6	7/9	..	3 17 5
Burco (5/-)	15	15	13/9	..	5 9 1
Callender's	15	15	4⅛	..	3 14 0
ChloridеElec.Storage	15	15	76/3	..	3 18 9
Cole, E. K. (5/–)	7	10	21/6	+3d.	2 6 6
Consolidated Signal	17	24	5¼	..	4 11 7
Cossor, A. C. (5/–)	15	10*	18/6	+6d.	5 8 1
Crabtree (10/–)	17½	17½	38/6xd	..	4 11 0
Crompton Parkinson Ord. (5/–)	30	20	26/–	..	3 17 0
E.M.I. (10/–)	6	6	22/–	+6d.	2 14 9
Elec. Construction	10	10	42/6	..	4 14 1
Enfield Cable Ord.	12½	12½	57/6	..	4 7 0
Elecl. Switchgear (10/–)	10	10	20/–	..	5 0 0
English Electric	10	10	47 6	..	4 4 0
Ensign Lamps (5/–)	25	25	18/9xd	+3d.	6 13 4
Ericsson Tel. (5/–)	22†	20†	47/6	..	2 2 2
Ever Ready (5/–)	40	40	38/6	..	5 4 0
Falk Stadelmann	7½	7½	29/–	..	5 3 5
Ferranti Pref.	7	7	28/9	..	4 17 5
G.E.C.: Pref.	6½	6½	34/3	..	3 16 0
,, Ord.	20	17½	89/–	..	3 18 8
Greenwood & Batley	15	15	36/6	..	8 4 4
HallTelephone(10/–)	10	12½	25/3	..	4 13 0
Henley's (5/–)	20	20	25/6	..	3 18 6
4½% Pref.	4½	4½	23/–	..	3 18 3
Hopkinsons	15	15	57/9	+3d.	5 3 5
India Rubber Pref.	5½	5½	20/–	..	5 10 0
Intl. Combustion	30	30	6¼	..	4 16 0
Johnson & Phillips	15	15	68/–	..	4 8 3
Lancashire Dynamo	20	22½	87/6xd	+3/–	5 2 8
Laurence,Scott(5/–)	15	12½	10/–	..	6 5 0
London. Elec. Wire	7½	7½	30/–	..	5 0 0
Mather & Platt	10	10	49/3	..	4 1 2
Met.Elec.CablePref.	5½	5½	21/3	..	5 5 6
Murex	20	20	5¼	+⅛	3 16 0
Pye Deferred (5/–)	25	25	21/3	..	5 17 8
Revo (10/–)	20	17½	35/–	..	5 0 0
Reyrolle	12½	12½	65/–	..	3 17 0
Siemens Ord.	7½	7½	30/9	+3d.	4 17 7
Strand Elec. (5/–)	4	7½	6/9	–6d.	5 11 1
Switchgear & Cowans (5/–)	10	20	15/–xd	+6d.	6 13 4
T.C.C. (10/–)	5	5	15/–	..	3 6 8
T.C. & M...	10	10	47/6	+6d.	4 4 1
Telephone Mfg. (5/–)	9	9	11/6	..	3 18 3
Thorn Elec. (5/–)	20	20	19/3	..	5 4 0
Tube Investments	23¾	20	93/6	+6d.	4 5 6
Vactric (5/–)	Nil	Nil	15/3	+6d.	—
Vickers (10/–)	10	10	19/6	..	5 2 7
WalsallConduits(4/–)	55	55	45/–	+1/–	4 17 10
Ward & Goldstone (5/–)	20	20	22/6	+6d.	4 9 0
Westinghouse Brake	10	12½	63/6	..	3 18 9
West, Allen (5/–)	7½	7½	7/–	..	5 7 2

* 5 per cent. tax-free. † Dividends free of Income Tax.

Stocks and Shares (*Continued from page* 436)

of his fellow directors of the Cossor board, Mr. T. A. Macauley, had been negotiating with another radio company, with a view to amalgamation. City men rubbed their eyes in astonishment at what is, though not unprecedented, a most unusual incident, and further developments are awaited with no little interest. The price of Cossor shares has risen to 18s. 6d. The radio share market has again been a good one. E. K. Cole 5s. shares are harder at 21s. 6d. and E.M.I. 10s. shares are better at 22s. Both give a negligible rate of yield on the basis of the last-paid dividends.

Shares on Offer

The prices in our weekly lists are the middle of the selling and buying quotations given in the Stock Exchange official lists. They do not represent either the actual buying or the selling price, being, as mentioned, the middle between the two. For the General Electrics quoted at 89s. the market price to a buyer is 90s., at which they yield £3 18s. 9d. per cent. Brush Electric 5s. ordinary shares are offered at 7s. 9d.; these return £3 17s. 3d. per cent. on the basis of the last-paid dividend of 6 per cent. It is hoped that the next dividend will be higher. Associated Electrical Industries came on offer at 52s. cum dividend. These return £3 16s. 9d. Walsall Conduits 4s. ordinary shares are to be obtained at 45s., at which the return comes to £4 17s. 10d. assuming maintenance of the 55 per cent. dividend. It may be of service to mention that within the past few business days 2,000 Southern Areas Electric ordinary shares have become available at 23s. 9d. These pay £4 4s. 3d. per cent. on the basis of the 5 per cent. dividend to which shareholders have been accustomed of recent years.

Whitehall Electric

The scheme for reducing the capital of Whitehall Electric Investments has been duly sanctioned. When the scheme is completed the capital of the company will be £5,000,000 in ordinary stock and £1¼ million in 6 per cent. cumulative preference stock. The year's dividend on the latter will require £75,000, and a year's revenue, it is estimated, will produce about £115,000.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AJAX Electrothermic Corporation.—" Electric arc-discharge apparatus." 8188/41. July 25th, 1940. (551715.)

Automatic Telephone & Electric Co., Ltd., F. E. Comyn and E. Frydman.—" Telephone systems." 11193. September 2nd, 1941. (551697.)

Babcock & Wilcox, Ltd., and C. H. Sparks.—" Desuperheaters." 11222. September 2nd, 1941. (551699.)

Babcock & Wilcox, Ltd., and R. E. Zoller.—" Boilers." 11223. September 2nd, 1941. (551700.)

Belling & Co., Ltd., and C. R. Belling.—" Electric boiling and cooking apparatus." 9526. July 26th, 1941. (551618.)

British Insulated Cables, Ltd., and H. R. F. Carsten.—" Apparatus for the measurement of electrical quantities at high frequencies." 13342. October 16th, 1941. (551588.)

British Thomson-Houston Co., Ltd.—" Electric lampholders." 16208/41. December 19th, 1940. (551592.) " Enamel compositions." 6643/42. May 20th, 1941. (551606.) " Resinous silicone condensation products." 5310/41. April 27th, 1940. (551649.) " Induction frequency - changers." 12681/41. October 2nd, 1940. (551679.) " Electric transformers." 12142/41. September 20th, 1940. (551709.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Means for maintaining constant tension in a continuous length of material when electrically driven." 6869. May 20th, 1942. (551607.)

British Thomson-Houston Co., Ltd., and R. Pohl.—" Dynamo-electric machines." 10916. August 27th, 1941. (551691.)

British Thomson-Houston Co., Ltd., W. J. Sims and B. P. Brunt.—" Electric tubular heating elements." 16475. December 22nd, 1941. (551593.)

Chloride Electrical Storage Co., Ltd., and H. J. Hampton.—" Separators for electric accumulators." 13705. October 24th, 1941. (551731.)

Curtis Manufacturing Co., Ltd., and F. C. Curtis.—" Contact brushes for wire-wound variable resistances or rheostats and other electrical apparatus." 14772. November 17th, 1941. (551747.)

F. B. Dehn (Wells-Gardner & Co., and Gard-Well Co., Inc.).—" Alarm signalling over electric distributing networks." 8989. July 16th, 1941. (551716.)

Dubilier Condenser Co. (1925), Ltd.—" Electrolytic condensers." 10872/41. August 30th, 1940. (551625.)

English Electric Co., Ltd., and W. G. Jowett.—" Dynamo-electric machinery." 17664/42. August 20th, 1941. (Divided out of 10586/41.) (551752.)

F. G. Gillard and Plessey Co., Ltd.—" Electric couplings." 10895. August 26th, 1941. (551626.)

Marconi's Wireless Telegraph Co., Ltd.—" Electromagnetic horn radiators." 11091/41. August 31st, 1940. (551585.) " Cathode-ray tubes." 10847/41. August 23rd, 1940. (551665.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—" Calomel electrodes." 1098. January 26th, 1942. (551598.) " Mechanical method for use in the separation of the shell and flesh of crustacea or the like." 11338. September 4th, 1941. (551674.) " Manufacture of magnetic circuits." 13723. October 24th, 1941. (551732.)

D. R. Pobjoy.—" Driving means for an electric generator." 10954. August 27th, 1941. (551667.)

Siemens & General Electric Railway Signal Co., Ltd., and J. W. A. Balfour.—" Remote electric switch control means for railway signals and points." 9829. August 1st, 1941. (551661.)

Siemens Bros. & Co., Ltd., and G. W. Sutton.—" Electromagnetic telephone instruments." 13102. October 10th, 1941. (551729.)

Standard Telephones & Cables, Ltd.—" Gas-filled electric-discharge tubes." 10734/41. August 29th, 1940. (551664.) " Radio receivers." 1249/41. October 4th, 1940. (551678.)

Standard Telephones & Cables, Ltd., and W. T. Gibson.—" Electric condensers." 11058. August 29th, 1941. (551638.)

Stone & Co., Ltd., and L. R. Nixon.—" Electric regulators of the carbon pile type." 11036. August 29th, 1941. (551635.)

Wallace & Tiernan Co., Inc.—" Treatment of aqueous material capable of exhibiting an electric potential, such as sewage or impure water, to eliminate undesired characteristics thereof." 5750/40. April 10th, 1939. (551645.)

T. R. Warren.—" Methods of and means for measuring the power factor of electrical insulation in alternating-current supply systems." 12808. October 3rd, 1941. (551724.)

H. Watson and A. Potts.—" Carbon holders for overhead electric-current collectors of electrically operated vehicles." 488. January 13th, 1942. (551596.)

Western Electric Co., Inc.—" Electrical connectors of the plug and socket type." 14618/41. November 28th, 1940. (551589.)

Westinghouse Brake & Signal Co., Ltd., and R. M. MacGregor.—" Code-transmitting devices for electric signalling systems." 2832. March 3rd, 1941. (551686.)

Westinghouse Brake & Signal Co., Ltd., L. E. Thompson and A. Jenkins.—" Alternating electric-current rectifiers of the selenium type." 11196. September 2nd, 1941. (Addition to 534043.) (551698.)

Westinghouse Electric International Co.—" Circuit arrangements for gaseous electric-discharge devices." 11910/40. October 1st, 1940. (551706.) " Electric circuit interrupters." 11204/41. September 19th, 1940. (551719.)

R. J. Wey.—" Electric measuring or control devices." 14690. November 14th, 1941. (551746.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Orders Placed

London.—HAMMERSMITH. Executive Committee. Accepted. Cables for twelve months ending March 31st, 1944. — E.h.v., h.v. and l.v. — Henley's. 7/·052 non-bleeding type. — Pirelli-General.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Andover.—Nursery; borough surveyor, Municipal Offices, Bridge Street.

Anglesey.—Dairy and creamery, Llangefni; A. Hewitt, architect, Town Hall, Llandudno.

Ardwick.—Additions to offices, Wentworth Street for Bouts-Tillotson Transport, Ltd.; A. Pickles, architect, 3, Ward's End, Halifax.

Bedwas and Machen.—Reconstruction of omnibus garage, for U.D.C.; surveyor, Council Offices, Bedwas, Cardiff.

Bexley.—Nursery (60 children), Lodge Lane area; W. Woodward, town clerk, Council Offices, Bexleyheath, Kent.

Billingham-on-Tees. — Houses; U.D.C. surveyor.

Boston.—Cleansing station for Health Committee; D. C. Cockrill, borough surveyor, Municipal Building, Boston.

Houses (16) for R.D.C.; C. Dawson, surveyor, Market Place.

Brinkburn (Northumberland).—Canteen; P. L. Browne, Son & Harding, Pearl Buildings, Newcastle-on-Tyne.

Bromsgrove.—Houses; Webb & Gray, architects, 200, High Street, Dudley, and H. T. W. Gough, architect, 45, Newhall Street, Birmingham, 3.

Coventry.—Experimental houses, Canley or Whoberley housing sites; Gyproc Products, Ltd., 21, St. James' Street, London, S.W.1.

British Restaurant, Broadgate; D. E. E. Gibson, city architect, 1a, Warwick Row.

Darlington. — Completion of partly-built houses; borough engineer.

Alterations for Stephenson & Hawthorn, Ltd.; W. S. Hutton, Ltd., builders, Post House Wynd.

Derbyshire.—Alterations to Council School, Killamarsh (£2,000); J. Harrison, county architect, County Offices, St. Mary's Gate, Derby.

Dunfermline.—Cold storage and office premises with rest rooms for staff for Dunfermline Co-operative Society, Ltd.; manager.

Durham.—Conversion of South Hetton Hall into remand home; county architect, 34, Old Elvet, Durham.

Ealing.—Civic restaurants, Northolt and Greenford areas; C. W. Seddon, borough engineer, Ealing Town Hall, W.5.

Feltham.—Baths for war workers (£750); surveyor, Council Offices, Bridge House.

Grimsby.—Adaptation of Abbey Villa as tuberculosis clinic; Swaby & Walsham, builders, Patrick Street, Grimsby.

Hampshire.—Classroom accommodation at County High School for Girls, Petersfield (£1,315); county architect, Winchester.

Isle of Wight.—School kitchen, Cowes (£1,220); county architect, County Hall, Newport.

Jarrow-on-Tyne.—Houses; borough engineer.

Leigh.—Workshop and garage for Cleansing Department (£8,000); T. A. Clare, borough surveyor, Town Hall.

Liverpool.—Garage (£4,462); L. H. Keay, city architect, Blackburn Chambers, Dale Street.

Loughborough.—Electrical massage and out-patients' departments (£25,000); secretary, District General Hospital.

Wartime bus station; W. Granger, borough engineer, Town Hall.

Mainsforth (Co. Durham).—Miners' canteen; G. Gradon & Sons, North Road, Durham City.

Manchester.—Offices, Great Ducie Street, for J. Cockshoot & Co., Ltd.; J. Beaumont & Sons, architects, Danlee Buildings, 53, Spring Gardens, Manchester, 2.

Newcastle-under-Lyme.—Houses for R.D.C.; A. P. Lovatt, architect, Hanover Chambers, Brunswick Street.

Newcastle-on-Tyne.—Additional day nurseries R. G. Roberts, city architect, 18, Cloth Market.

Offices for G. Angus & Co.; Hetherington & Wilson, Gounty Chambers, Westgate Road.

Poole.—Clinic at Mount Street Centre (£1400); J. R. Barron, borough engineer, Municipal Buildings, Park Gates East.

Ravensthorpe. — Additions to bakery; J. Heppleston & Son, Sackville Street.

Sittingbourne and Milton.—Nursery, Johnson House, Burley Road, for U.D.C.; engineer, Town Hall, Sittingbourne.

Tamworth.—Houses for R.D.C.; B. K. Nightingale, surveyor, Acacia House, Lichfield Road.

Twickenham.—Bathrooms and other additions, St. Mary's Hospital, Hampton; borough engineer, Municipal Offices, York House.

Wallsend.—Canteen, Gut Road; R. Hood, Haggie & Son, Ltd.

British Restaurant, Station Road; J. A. Blench, borough engineer.

Institute of Export Luncheon

Mr. L. C. Gamage, M.A., M.C., vice-chairman and joint managing director of the General Electric Co., Ltd., will preside at a luncheon arranged by the Institute of Export to take place at the Connaught Rooms, Great Queen Street, London, W.C.2, on March 29th, at 12.45 p.m.